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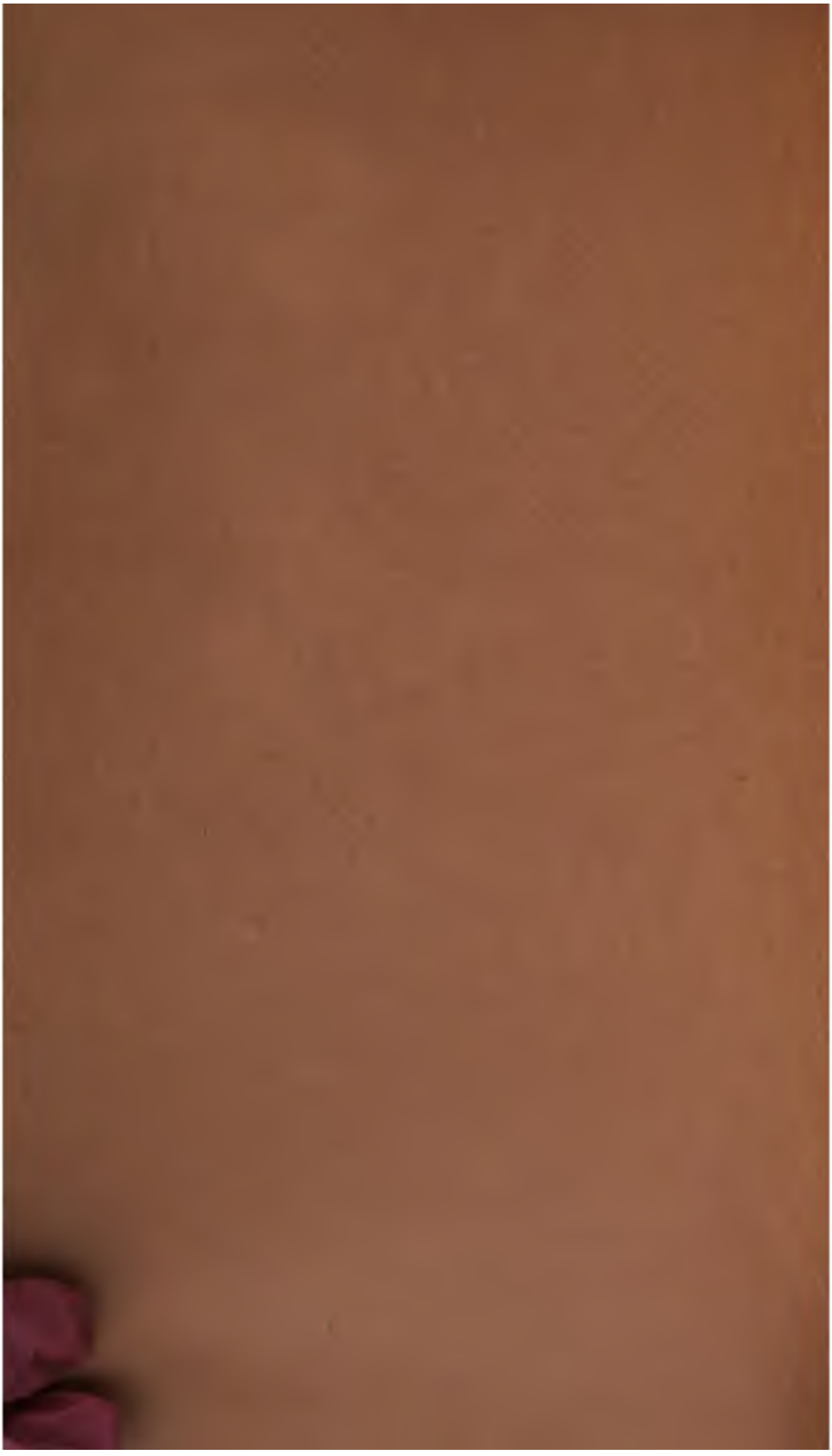

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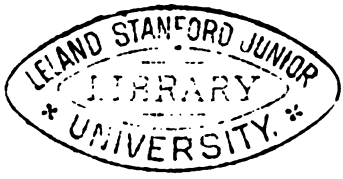

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SCHALOW, Dr. HERMAN, 28 Paul Str., N. W., Berlin.....1884
SCHRENCK, Dr. LEOPOLD VON, St. Petersburg.....1884
SELYS-LONGSCHAMPS, Baron EDMOND DE, Liége. Belgium.....1884
SHELLEY, Capt. G. E., 6 Tenterden St., Hanover Sq., London.....1884
THEEL, Dr. HJALMAR, University of Upsala, Upsala, Sweden.....1884
TRISTRAM, Rev. Canon H. B., The College, Durham, England.....1884
TSCHUSI ZU SCHMIDHOFFEN, Count VICTOR RITTER VON, Hallein, (Villa Hännenhof), Salzburg, Austria.....1884
WATERHOUSE, F. H., 3 Hanover Square, London, W.....1889
WHARTON, HENRY T., 39 St. George's Road, Kilburn, London, N. W. 1884
ZELEDON, Don José C., San José, Costa Rica.....1884

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ADAMS, STEPHEN J., Cornish, Me.....1892
ADNEY, E. T., 189 West 136th St., New York City.....1885
ALLEN, Dr. CHARLES SLOVER, 21 East 28th St., New York City....1888
ALLEN, FRANCIS H., West Roxbury, Mass.....1888
AMERY, CHARLES F., 123 Bible House, New York City.....1886
ANTHONY, A. W., 2042 Albatross St., San Diego, Cala.....1885
ARCHER, W. C., 252 7th St., Jersey City, N. J.....1888
ATKINS, J. W., Key West, Florida.....1887
ATTWATER, H. P., Rockport, Texas.....1891
AVERILL, C. K., Jr., Bridgeport, Conn.....1885
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AYER, ED. E., cor. Dearborn and Adams Sts., Chicago, Ill.....1889
BABBITT, JAMES P., Taunton, Mass.....1891
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BAGG, EGBERT, 187 Genesee St., Utica, N. Y.....1883
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BAILY, WILLIAM L., 138 South 4th St., Philadelphia, Pa.....1885
BANGS, EDWARD APPLETON, 31 Pemberton Sq., Boston, Mass.....1884
BANGS, OUTRAM, 31 Pemberton Sq., Boston, Mass.....1884
BANKS, J. W., St. John, N. B.....1887
BARBOUR, E. H., Lincoln, Nebraska.....1892
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BAUR, Dr. G., Univ. of Chicago, Chicago, Ills.....1892
BEAL, F. E. L., 1414 Corcoran St., Washington, D. C.....1887
BEAN, J. BELLFIELD, Nicollet, Minn.....1892
BEARD, DANIEL C., 110 Fifth Ave., New York City.....1887
BEHR, EDWARD A., 428 Henry St., Brooklyn, N. Y.....1892
BELL, JAMES P. H., Gainesville, Fla.....1889
BELLOWS, ED. D., 215½ 4th St., Jersey City, N. J.....1889
BENNER, FRANKLIN, 110 2d St., North Minneapolis, Minn.....1883
BENNERS, GEO. B., 122 Walnut St., Philadelphia, Pa.....1889
BENSON, Lieut. H. C., U. S. A., The Presidio, San Francisco, Cala..1886
BENT, ARTHUR CLEVELAND, Plymouth, Mass.....1889
BERGTOLD, Dr. W. H., 56 Allen St., Buffalo, N. Y.....1889
BERIER, DELAGNEL, Bay Ridge, Kings Co., N. Y.....1885
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BISHOP, Dr. LOUIS B., 77 Whitney Ave, New Haven, Conn.....1885

BOARDMAN, GEORGE A., Calais, Maine.....1883
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BOIES, A. H. Hudson, Mich.....1890
BOLLES, FRANK, Harvard College, Cambridge, Mass.....1889
BOND, FRANK, Cheyenne, Wyoming..... 1887
BOND, HARRY L. Sioux City Iowa.....1890
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BOWLES, J. H., Ponkapog Mass.....1891
BRADFORD, L. M. B. Providence, R. I.....1889
BRANDRETH, FRANKLIN, Sing Sing, N. Y.....1889
BRIMLEY C. S., Raleigh, N. C.....1888
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BROWN, A. D., Pipestone, Minn.....1891
BROWN, EDWARD J. 820 20th St. N. W., Washington, D. C.....1891
BROWN, HERBERT, Tucson, Arizona.....1885
BROWN, HUBERT H., 22 Collier St. Toronto, Ontario 1889
BROWN, JOHN CLIFFORD, 85 Vaughan St Portland, Maine.....1888
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BROWNE, FRANCIS CHARLES, Framingham, Mass.....1883
BULLEY REGINALD H Canton Ohio.....1889
BURNS, FRANK L., Berwyn, Chester Co., Pa.....1891
BUTLER, AMOS W., Brookville, Ind.....1885
CAIRNS, JOHN S., Weaverv le, N. C.....1889
CAMPBELL, HARVEY C., Lansingburg, Rens. Co., N. Y 1890
CARRUTH, CHARLES THEODORE, 119 Milk St., Boston, ...1891
CASE, CLIFFORD M., 54 Babcock St., Hartford, Conn.....1892
CAULK WM. B., Terre Haute, Ind..... 1891
CHAMBERLAIN C. W., 51 Lincoln St., Boston, Mass.....1885
CHASE, VIRGINIUS H., Wady Petra, Ills.....1892
CHERRIE, GEORGE K., Museo Nacional, San José, Costa Rica.....1891
CHURCHILL, GEORGE B., 912 Spruce St., Philadelphia, Pa.....1890
CLARK, HUBERT LYMAN, 3922 5th Ave., Pittsburgh, Pa.....1886
CLARK, J. N., Saybrook, Conn.....1885
CLARKE, Prof. S. F., Williamstown, Mass..... 1890
CLUTE, WILLARD N., 11 Jarvis St., Binghamton, N. Y.....1889
COALE, H. K., 131 Wabash Ave., Chicago, Ill.....1883
COBB, MISS JULIAETTE J West Brookfield, Mass.....1892
COLBURN, A. E., 38 Broadway, New York City.....1891
COLBURN, W. W., Springfield, Mass.....1889
COLLINS, Capt. J. W., Smiths. Inst., Washington, D. C.....1888
COLT, WILLIAM C., 59 Pleasant St., Worcester, Mass.....1892
COMEAU, NAPOLEON A., Godbout, P. Q.....1885
CONKLIN, CHARLES E. Roslyn, N. Y.....1892
CONKLIN, Dr. WILLIAM A., 10th Ave. cor. 187th St., New York City.1885
COOK, Prof. CHARLES B., Agricultural College P. O., Mich.....1890
COOMBS, FRANK E., Natick, Mass.....1890

COPE, ALBAN, Germantown, Pa.....1885
COPE, FRANCIS R., Jr., Germantown, Pa.....1892
COPELAND, A. M., Springfield, Mass.....1889
CORNING, ERASTUS, Jr., Albany, N. Y. 1891
COUES, ELLIOTT BAIRD, care of Dr. E. Coues, Smiths. Inst., Washington, D. C.....1886
COUES, WILLIAM PEARCE, 14 Ash St., Cambridge, Mass.....1888
CRAMPTON, H. E., Jr., 256 W. 121st St., New York City 1891
CRANDALL, C. W., Woodside, Queen's Co., N. Y. 1891
CULVER, Col. JOHN Y., Room 150, Potter Building, New York City.1890
DAENZER, CARL, 13 North 3d St., St. Louis, Mo.....1888
DAFFIN, W. H., 938 Silver St., Philadelphia, Pa.....1892
DAGGETT, FRANK S., Duluth, Minn.....1889
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DAVIS, GEORGE A., Mexico, N. Y.....1890
DAVISON, J. L., Lockport, Niagara Co., N. Y.....1885
DELAFIELD, JOSEPH L., 475 5th Ave., New York City.....1888
DENNE, DAVID, 104 St. Francois St., Montreal 1890
DETWILLER, Dr. JNO. W., Bethlehem, Pa.....1891
DEWEY, MARGARET, 108 Pearl St., Springfield, Mass.....1892
DICKINSON, EDWIN, Springfield, Mass.....1885
DICKINSON, W. S., Tarpon Springs, Fla. 1891
DILLE, FREDERIC M , 806 Boston Bldg., Denver, Colo.....1892
DIXON, FREDERIC J., Hackensack, N. J. 1891
DOUGHERTY, CAPT. W. E., U. S. A., Angel Island, Cala. 1890
DOUGLASS, BERT H., Burlington, Kansas 1890
DUNBAR, W. LINFRED, Public Library, Bridgeport, Conn.....1892
DURFEE, OWEN, Box 125, Fall River, Mass. 1887
DUTCHER, B. H., 525 Manhattan Ave., New York City..... 1886
DYCHE, Prof. L. L., Lawrence, Kansas.....1886
EAMES, Dr. EDWIN H., Bridgeport, Conn. 1888
EASTMAN, HARRY D., Framingham, Mass. 1891
EATON, ALVAH A., Riverdale, Cala.....1890
EDDY, N. A., 615 North Grant St., Bay City, Michigan.....1885
EDGAR, NEWBOLD, 28 E. 39th St., New York City 1891
EDSON, JOHN M., New Whatcom, Washington.....1886
ELDON, CHARLES H., Williamsport, Pa. 1891
ELROD, Prof. M. J., Illinois Wesleyan Univ., Bloomington, Ills.....1892
EMERSON, W. OTTO, Haywards, Cala.....1885
EVANS, EVAN M., Englewood, N. J.....1888
EVANS, SAMUEL C., JR., Riverside, Cala. 1889
EVERMANN, Prof. BARTON W., U. S. Fish Commission, Washington, D. C.....1883
FAIRBANKS, Hon. FRANKLIN, St. Johnsbury, Vt.....1885
FANNIN, JOHN, Provincial Museum, Victoria, B. C.....1888
FARLEY, JOHN A., Newton, Mass.....1892
FAXON, WALTER, Mus. Comp. Zoöl., Cambridge, Mass.....1891

FERNALD, ROBERT H., Orono, Me.....1890
FIGGINS, J. D., Kensington, Md.....1889
FISHER, WILLARD J., Medway, Mass.....1892
FISHER, WILLIAM HUBBELL, 12 Wiggins Block, Cincinnati, Ohio....1883
FLINT, H. W., Yale National Bank, New Haven, Conn.....1888
FLINT, WILLIAM R., Madera, Fresno Co., Cala.....1890
FLOYD, HARRY WEBB, 164 S. Elliott Place, Brooklyn, N. Y.....1892
FORBUSH, EDWARD H., Malden, Mass.....1887
FOWLER, Capt. J. L., 2d Calvary U. S. A., Fort Bowie, Ariz.....1892
FOX, Dr. WILLIAM. H., 1826 Jefferson Place, Washington, D. C.....1883
FUERTES, LOUIS AGASSIZ, Ithaca, N. Y.....1891
GALE, DENIS, Gold Hill, Boulder Co., Colorado.....1886
GAULT, B. T., Glen Ellyn, DuPage Co., Ill.....1885
GESNER, Rev. A. H., Sing Sing, N. Y.....1885
GIBSON, LANGDON, Flushing, N. Y.....1887
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GILBERT, CHARLES H., Palo Alto, Cala.....1892
GOODALE, JOSEPH LINCOLN, 67 Sparks St., Cambridge, Mass.....1885
GORDON, THEODORE, Savannah, Ga.....1891
GOSS, B. F., Pewaukee, Waukesha Co., Wis.....1883
GOULD, JOSEPH E., 281½ North High St , Columbus, Ohio.....1889
GRANGER, WALTER W., Am. Mus. Nat. Hist., New York City.....1891
GRANT, JNO. B., 233 Madison Ave., New York City.....1890
GREEN, MORRIS M., 410 Graves St., Syracuse, N. Y.....1886
GREENE, I. C., Amherst, Mass.....1891
GREGG, Dr. WILLIAM H., 143 West 21st St., New York City.....1883
HALES, HENRY, Ridgewood, N. J.....1890
HAMFELDT, A., Ottawa, Ills.....1892
HANMER, C. C., Burnside, Conn.....1888
HARGITT, CHARLES W., 904 E. Genesee St., Syracuse, N. Y.....1892
HARDY, MANLY, Brewer, Maine.....1883
HARTE, CHARLES R., Columbia College, New York City.....1890
HARTZELL, Prof. JAMES C., JR., Orangeburg, S. C.. 1892
HASBROUCK, EDWIN M., 1303 Corcoran St., Washington, D. C.....1887
HAWLEY, A. H., Vineland, N. J.....1886
HAZARD, R. G., 2d, Peace Dale, R. I.....1885
HAZZARD, Dr. T. L., Alleghany, Pa.....1891
HEDGES, CHARLES F., New Haven, Conn.....1891
HEIMSTREET, Dr. T. B., 14 Division St., Troy, N. Y.....1888
HELME, ARTHUR H., Miller's Place, Suffolk Co., N. Y.....1888
HENDRICKSON, W. F., 860 Broadway, New York City.....1885
HENNING, CARL FRITZ, Boone, Iowa.....1892
HICKS, BENJAMIN D., Old Westbury, N. Y.....1892
HICKS, HENRY, Westbury Station, Queens Co., N. Y.....1888
HIGGINS, HENRY C., Cincinnatus, N. Y.....1892
HINE, Mrs. JANE L., Sedan, Ind.....1890
HITCHCOCK, FRANK HENRY, Dept. of Agriculture, Washington, D.C. 1891

HOADLEY, Dr. FREDERIC H., 9 W. 30th St., New York City.....1891
HOAG, BENJAMIN, Stephentown, N. Y.....1892
HOLBROOK, Judge S. T., Norwich, Conn.....1885
HOOPES, JOSIAH, West Chester, Pa.....1889
HORNADAY, W. T., 42 Niagara St., Buffalo, N. Y.....1888
HOUGH, ROMEYN B., Lowville, N. Y.....1883
HOWELL, ARTHUR H., 212 Madison St., Brooklyn, N. Y.....1889
HOYLE, CHARLES E., West Millbury, Mass.....1889
HOYT, F. R., Watkins, N. Y.....1891
HOYT, WILLIAM H., Stamford, Conn.....1888
HOWE, C. P., Waukesha, Wis.....1891
HUBBARD, Mrs. SARA A., 39 33rd St., Chicago, Ill.....1891
HUGHES, Dr. WILLIAM E., 3726 Baring St., Philadelphia, Pa.....1891
HULL, WALTER B., Box 47, Milwaukee, Wis.....1889
HURD, THEODORE D., Riverside, Cala.....1890
HVOSLEF, Dr. J. C., Lanesboro, Minn.....1885
HYATT, Miss MARY, Stanfordville, N. Y.....1891
INGALLS, CHARLES E., East Templeton, Mass.....1885
INGERSOLL, ALBERT M., 816 5th St., San Diego, Cala.....1885
INGRAHAM, D. P., Elmira, N. Y.....1889
ISHAM, C. B., Am. Mus. Nat. Hist., New York City.....1891
JACKSON, THOMAS H., West Chester, Pa.....1888
JACOBS, J. WARREN, Waynesburg, Pa.....1889
JAMES, HOWARD K., Rockville, Conn.....1888
JEFFRIES, WILLIAM AUGUSTUS, 78 Devonshire St., Boston, Mass.....1883
JENKS, Prof. J. W. P., 62 George St., Providence, R. I.....1888
JESURUN, Dr. MORTIMER, Douglas, Wyoming.....1890
JOHNSON, ALBERT I., Hull, Iowa.....1885
JOHNSON, FRANK E., Parkville, Kings Co., N. Y.....1888
JOHNSON, FREDERIC O., Los Angeles, Cala.....1888
JOHNSTON, Dr. A. D., Allegheny City, Pa.....1891
JONES, LYNDS, Oberlin, Ohio.....1888
JONES, Prof. MARCUS E., Salt Lake City, Utah.....1890
JORDAN, A. H. B., Willsborough, Essex Co., N. Y.....1888
JORDAN, DAVID STARR, Leland Stanford, Jr., Univ., Menlo Park, Cala.....1885
JOUY, P. L., Smiths. Inst., Washington, D. C.....1883
KEELER, CHARLES A., Berkeley, Alameda Co., Cala.....1889
KELLER, CLYDE L., 318 Exchg. Blk., Salem, Oregon.....1892
KELLOGG, VERNON L., Lawrence, Kansas.....1888
KENDALL, W. C., U. S. Fish Commission, Washington, D. C.....1889
KENNARD, FREDERIC HEDGE, Brookline, Mass.....1892
KEYSER, LEANDER S., Springfield, Ohio.....1891
KING, GEORGE GORDON, Newport, R. I.....1888
KIRKPATRICK, H. C., Meadville, Pa.....1891
KIRKWOOD, F. C., 115 Concord St., Baltimore, Md.....1892
KNOWLTON, F. H., U. S. Nat. Mus., Washington, D. C.....1883

KOCH, Prof. AUGUST, Williamsport, Pa.....1891
KOCH, FREDERIC W., Twin Oaks, San Diego Co., Cala.....1891
KOHN, GUSTAVE, 14 Carondelet St., New Orleans, La.....1886
KOUMLY, Rev. PIRMINE M., Seneca, Kas.....1892
LADD, SAMUEL B., West Chester, Pa.....1889
LAMB, Prof. ELI M., Friends' High School, Baltimore, Md.....1891
LANGDON, EDWIN, Central National Bank, New York City.....1891
LANO, ALBERT, Madison, Minn.....1890
LANTZ, Prof. D. E., Manhattan, Kansas.....1885
LAWRENCE, ROBERT B., Mills Building, New York City.....1883
LAWRENCE, ROBERT HOE, Duarte, Cala.....1890
LEVINGS, GLENN V. B., 117 W. 58th St., New York City.....1892
LEWIS, E. G., Hartford, Conn.....1888
LEWIS, WILLIAM H., Pawtucket, R. I.....1890
LEWIS, JOHN B., Eubanks, Pulaski Co., Ky.....1890
LINSKILL, DAVID J., Plymouth, Pa.....1891
LLOYD, WILLIAM, Brownsville, Texas.....1885
LOCKWOOD, Dr. SAMUEL, Freehold, N. J.....1890
LONG, H. B., Lake View, Mass.....1889
LOOMIS, JOHN A., Paint Rock, Concho Co., Texas.....1887
LORING, J. ALDEN, Owego, N. Y.....1889
MACDOUGALL, GEO. R., 88 Wall St., New York City.....1890
MACGILLIVRAY, ALEXANDER D., Cornell Univ., Ithaca, N. Y.....1890
MACKAY, Prof. A. H., Halifax, Nova Scotia.....1885
MACKAY, GEORGE H., Nantucket, Mass.....1890
MACOUN, Prof. JOHN, Geol. and Nat. Hist. Surv., Ottawa, Ontario..1883
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MCGREGOR, R. C., 2847 Champa St., Denver, Col.....1889
MAITLAND, ROBERT L., 70 Broad St., New York City.....1889
MALI, CHARLES M., 329 Broadway, New York City.....1889
MARSHALL, ALFRED, 59 South Canal St., Chicago, Ills.....1886
MASON, EDWARD CAMPBELL, 377 Main St. Buffalo, N. Y.....1888
MELZER, JAMES P., Milford, N. H.....1891
MERRIAM, FLORENCE A., Locust Grove, Lewis Co., N. Y.....1885
MERRILL, HARRY, Bangor, Maine.....1883
METCALFE, WILLIAM C., 21 Cortlandt St., New York City.....1886
MILLER, GERRIT SMITH, JR., 120 Brattle St., Cambridge, Mass.....1886
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MONTGOMERY, THOMAS H., JR., West Chester, Pa.....1891
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MURDOCH, JOHN, Middleboro, Mass.....1883
NACHTRIEB, HENRY F., Univ. of Minn., Minneapolis, Minn.....1892
NASH, H. W., Pueblo, Colorado.....1892
NICHOLAS, Dr. GEORGE L., North Brother Island, New York City....1888
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NICHOLS, J. M., Greene, Maine.....1890
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NORTON, RICHARD, Cambridge, Mass.....1888
OBERHOLSER, HARRY C., Wooster, Ohio.....1888
OLDFIELD, W. A., Port Sanilac, Mich.....1891
OLDRIGHT, CHARLES D., Austin, Texas.....1890
ONG, PLUMMER L., Milan, Sullivan Co., Mo.....1888
ORTH, GEORGE S., 406 S. Highland Ave., Pittsburgh, Pa.....1892
OSBORN, Rev. WILLIAM, Golden, Col.....1890
PAINE, AUGUSTUS G., Jr., Room 60, Times Bldg., New York City...1886
PALMER, E. L., New Haven, Conn.....1891
PALMER, THEODORE S., Dept. of Agriculture, Washington, D. C....1888
PALMER, WM., U. S. Nat. Mus., Washington, D. C.....1888
PANNEPACKER, D. E., 2550 North 12th St., Philadelphia, Pa.....1888
PARK, AUSTIN F., 31 Boardman Building, Troy, N. Y.....1885
PARK, J. T., Warner, Tenn.....1890
PEABODY, Rev. P. B., Owatonna, Minn.....1891
PEABODY, WILLIAM RODMAN, Cambridge, Mass.....1890
PEACOCK, W. F., Marysville, Cala.....1888
PEARSON, T. GILBERT, Archer, Fla.....1891
PENNOCK, C. J., Kennett Sq., Chester Co., Pa.....1888
PERKINS, CHARLES E., Hartford, Conn.....1888
PERNOT, E. A., Corvallis, Oregon.....1891
PETERSON, J. P., Luck, Wis.....1885
PHILLIPS, A. H., 77 Biological Laboratory, Princeton, N. J.....1891
PIERCE, A. K., Renovo, Pa.....1891
PIERS, HARRY, Willow Park, Halifax, N. S.....1891
PLEASANTS, J. H., Jr., 606 Cathedral St., Baltimore, Md.....1888
POPENOE, Prof. E. A., Manhattan, Kan.....1886
POSSON, NEIL F., Medina, N. Y.....1890
PRAEGER, WILLIAM E., Keokuk, Iowa.....1892
PRATT, W. E., Lake Forest, Ill.....1890
PREBLE, EDWARD A., Dept. of Agriculture, Washington, D. C.....1892
PRENTISS, D. W., JR., Washington, D. C.....1890
PRILL, Dr. A. G., Sodaville, Oregon.....1890
PRIME, Rev. WENDELL, 38 Park Row, New York City.....1889
RAGSDALE, G. H., Gainesville, Texas.....1885
RAINE, WALTER, 181 Bleecker St., Toronto, Ontario.....1889
RALPH, Dr. W. L., 26 Court St., Utica, N. Y.....1888
RAUB, Dr. M. W., Lancaster, Pa.....1890
RATHBUN, FRANK R., 40 Franklin St., Auburn, N. Y.....1883

RAWSON, CALVIN L., Norwich, Conn.....1885
REDINGTON, ALFRED P., 23 Second St., San Francisco, Cala.....1890
REED, CHARLES K., Worcester, Mass.....1890
REED, J. HARRIS, Beverly, N. J.....1890
REISER, Rev. F., Marysville, Cala.....1892
RHOADS, SAMUEL N., Haddonfield, N. J.....1885
RICE, FRANK L., 47 S Canal St., Chicago, Ills.....1886
RICHARDS, JOHN BION, 8 Barnaby St., Fall River, Mass.....1888
RICHARDSON, JENNESS, Am. Mus. Nat. Hist., New York City.....1888
RICHARDSON, W. M., Am. Mus. Nat. Hist., New York City.....1891
RICHMOND, CHARLES W., Bluefields, Nicaragua.....1888
RIDGWAY, JOHN L., U. S. Geol. Surv., Washington, D. C.....1890
RIECKER, ERNST, 900 South 4th St., St. Louis, Mo.....1888
RIKER, C. B., South Orange, N. J.....1885
RILEY, Prof. C. V., U. S. Entomologist, Washington, D. C.....1885
RIVES, Dr. WILLIAM C., 113 East 38th St., New York City.....1885
ROBBINS, WILLIAM A., 178 Garfield Place, Brooklyn, N. Y.....1888
ROBERTS, GEORGE W., West Chester, Pa.....1891
ROBERTS, W. F., 1421 G St., N. W., Washington, D. C.....1888
RODDY, Prof. H. JUSTIN, Millersville, Pa.....1891
ROOSEVELT, Hon. THEODORE, Oyster Bay, Queens Co., N. Y.....1888
ROWLAND, THOMAS, 182 6th Ave., New York City.....1890
ROWLEY, J., JR., Am. Mus. Nat. Hist., New York City.....1889
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RUSSELL, ROY, Kokomo, Indiana.....1891
SAGE, HENRY M., Albany, N. Y.....1885
SARGENT, HARRY B., Niagara Falls, N. Y.....1892
SCHLEGEL, MATILDE, East Aurora, N. Y.....1889
SCHURR, THEODORE A., Pittsfield, Mass.....1888
SCHWAB, Rev. L. H., 101 Lawrence St., New York City.....1892
SCOTT, W. L., 74 Sparks St., Ottawa, Ontario.....1883
SCROGGS, Dr. G. A., Beaver, Pa.....1891
SEE, ABRAM W., Arlington, N. J.....1888
SEITER, PHILIP J., Bridgeport, Ala.....1888
SHEPPARD, EDWIN, Acad. Nat. Sci., Philadelphia, Pa.....1892
SHERRATT, W. J., 263 North 2d St., Philadelphia, Pa.....1891
SHORES, Dr. E. I., Soldiers' Home, Hampton, Va.....1883
SHORT, ERNEST H., Chili, N. Y.....1891
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SMALL, FREDERIC L., Provincetown, Mass.....1891
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SMITH, JAMES E., East Killingly, Conn.....1889
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SMITH, S. SIDNEY, 59 Wall St., New York City.....1888

SMYTH, ELLISON A., JR., Va. Agr. and Mech. Coll., Blacksburg, Va..1892
SORNBORGER, JEWELL D., Cambridge, Mass.....1888
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SOUTHWICK, WILLIAM C., Raritan, N. J.....1891
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STEERE, Prof. J. B., Ann Arbor, Mich.....1890
STEPHENS, F., Santa Ysabel, San Diego Co., Cala.....1883
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STRONG, REUBEN M., Wauwatosa, Wis.....1889
STUDER, JACOB H., P. O. Box 2417, New York City.....1888
SURBER, THADDEUS, White Sulphur Springs, West Va.....1890
SWALLOW, C. W., Willsburgh, Multuoma Co., Oregon.....1890
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TEST, F. C., U. S. Nat. Mus., Washington, D. C.....1892
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THOMSON, Prof. GEORGE S., Boulder, Colo.....1892
THORNE, Capt. PLATTE M., 22d Inf. U. S. A., Ft. Keogh, Montana..1885
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TODD, W. E. CLYDE, Dept. Agriculture, Washington, D. C.....1890
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ACTIVE MEMBERS.

Date of Death

BAIRD, SPENCER FULLERTON.....Aug. 19, 1887
GOSS, N. S.....March 10, 1891
HOLDER, JOSEPH B.....Feb. 28, 1888
JEFFRIES, JOHN AMORY.....March 26, 1892
WHEATON, JOHN M.....Jan. 28, 1887

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PARKER, WILLIAM KITCHEN.....July 3, 1890
PELZELN, AUGUST VON.....Sept. 2, 1891
SCHLEGEL, HERMANN.....Jan. 17, 1884
TACZANOWSKI, LADISLAS.....Jan. 17, 1890

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Blakiston, Thomas W.....Oct. 15, 1891
Bogdanow, Modest N .....March 4, 1888
Haast, Julius von.....Aug. 15, 1887
Homeyer, E. F von.....May 31, 1889
Marschall, A. F .....Oct. 11, 1887
Prejevalski, N M .....Oct. 20, 1887
Pryer, Harry James Stovin .....Feb. 17, 1888
Severtzow, N. .....Feb. 8, 1885
Stevenson Henry.....Aug. 18, 1888

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Atkins, H A .....May 19, 1885
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Breese, William L.....Dec. 7, 1889
Coe, W. W. .....April 26, 1885
Elliott, S Lowell .....Feb. 11, 1889
Howland John Snowdon .....Sept. 19, 1885
Kumlien, Thure.....Aug. 5, 1888
Linden, Charles .....Feb. 3, 1888
Mabbett, Gideon .....Aug. 15, 1890
Minot, Henry Davis .....Nov. 13, 1890
Northrop, John I.....June 26, 1891
Small, Edgar A .....April 24, 1884
Vennor, H G .....June 8, 1884
Willard, Samuel Wells.....May 24, 1887
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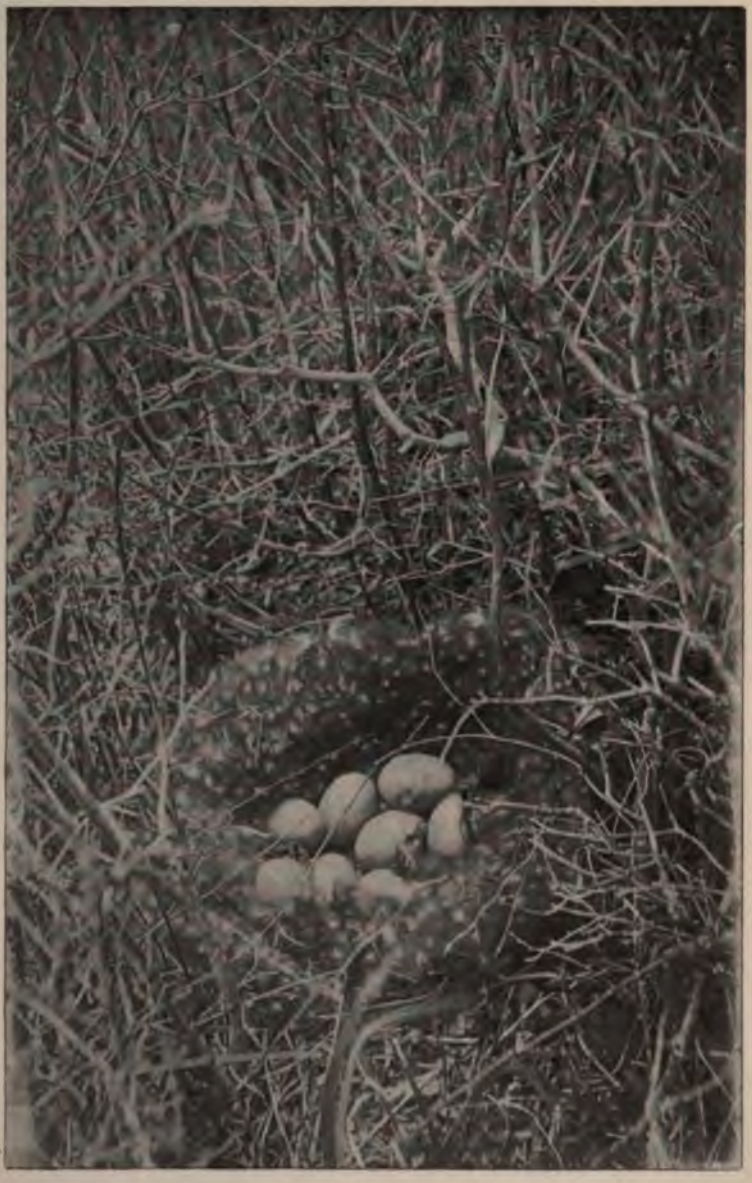

BLACK DUCK'S NEST, PLUM ISLAND, N. Y.

BLACK DUCK GROUP.

IN AMERICAN MUSEUM OF NATURAL HISTORY.

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SUMMER BIRDS OF PRINCE EDWARD ISLAND.

BY JONATHAN DWIGHT, JR.

LYING in the southern part of the Gulf of St. Lawrence, its low outlines just visible from the mainland, is Prince Edward Island, called by some one the 'Garden of the Gulf.' Compared with the rugged Labrador or Cape Breton coasts of the Gulf, this patch of green on the surrounding blue waters might to a fervid imagination suggest the appellation of garden, but when the climate, with its long winters and brief summers, and the limited productions of the island are taken into account, not to mention the semi-civilized aspect of much of the country, the name of garden does not strike the beholder as particularly descriptive. However, it is not my present purpose to do more than indicate the salient features of the island's topography and flora, that my fellow ornithologists may follow me the more understandingly in my endeavor to introduce to them the avifauna of a considerable area hitherto neglected by our fraternity. Anticosti, Newfoundland, Cape Breton, and particularly the Magdalen Islands have all been visited, but Prince Edward Island has been passed by, probably because it seemed to offer fewer attractions than these wilder, rougher islands.

Notwithstanding the probability that I should only meet with

birds whose acquaintance I had already made in other parts of Canada, I nevertheless devoted a couple of weeks last summer to exploring the island, and am now able to say what species are characteristic summer residents; and a few words about them may not come amiss to those of us who may be familiar with them only during the migration seasons.

The length of my stay was from June 23 to July 9, and by means of the narrow-gauge railroad, supplemented by horse power, I visited both extremities of the island, making Tignish and Souris my headquarters. The remarkable feat of connecting these places by 167 miles of railroad has been accomplished (the air line distance is less than 100 miles), the promoters of the road being desirous no doubt that each feature of the landscape should be viewed by the travelling public from at least three different points of the compass. I also stopped at intermediate points. The weather was favorable, mostly bright, the raw winds from the northeast and the brief rainstorms peculiar to the Gulf being the only disagreeable features, and these were less pronounced as July advanced and the sun gained power. What the climate must be in the winter time, when a belt of ice extending as far as the eye can reach surrounds the island, and binds it to the mainland by ever shifting floes, can only be inferred from the chilling breath of the northerly breezes that in summer sweep over the frigid water of the Gulf. The ice is said to disappear in April and spring opens, but the summer is brief and chiefly confined to the months of July and August. Brant regularly remain till the 8th of June. With such a backward spring and such a cool and brief summer it is not surprising that agriculture, beyond the production of hay, potatoes and oats, does not flourish. Corn is rarely attempted, and usually suffers by early frost.

Prince Edward Island has the form of an irregular crescent, the concavity to the northward. It embraces an area of 2133 square miles. Its extreme length from East Point to West Point is about one hundred and twenty miles, and its width would probably average about twenty miles, for the coast line is very much indented by bays. By means of them it is, roughly speaking, cut into three sections. The westernmost is the narrowest, the width increasing eastward to nearly forty miles, the island tapering off again to a point at its eastern extremity.

The geological formation of the island is a red, crumbling sandstone that gives rise to low bluffs ten to twenty feet high along the coast, these reaching a height of sixty or seventy feet at some points, notably near North Cape, at East Point, and on the north shore near New London. The bluffs (or 'clifts' as they are called by the natives) are practically perpendicular, the waves eating them away below, and usually there is a gravelly beach of detritus at their base. They are often guttered by streams, and sloping down, parallel to the water's edge, may be replaced by reaches of gravel or sand, or perhaps low islands, behind which are found lagoons and salt marshes, but in a few miles, perhaps in a few hundred yards, they may again unexpectedly rise to considerable height. The wind-swept sand beaches are chiefly along the north shore, interrupted at times by the red bluffs; and although there is always a perceptible reddish tinge to the sand, it is surprising how white it may become in some localities. The drifted sand-hills, fringed with more or less scanty grass, suggested the possibility of finding the Ipswich Sparrow, and yet my efforts were unrewarded, the Savanna Sparrows met with in such places being in no wise lighter-colored than those of adjacent fields.

A green belt of farming country encircles the island, the pastures in many places extending to the very edge of the bluffs, and back of them the land is slightly rolling, nowhere reaching any considerable altitude. The only marked inequalities are due to the erosion of small brooks, and the general effect is that of a flat country. In the central section, the best settled, the farms extend from shore to shore and have succeeded the forest that once clothed the whole island. The timber has been nearly all cut, and no large bodies remain except in the western and eastern sections, where bears, still surviving in limited numbers, indicate the nature of the unsettled tracts. A few 'blueberry barrens' were noticed. Most of the island appears to be well drained and comparatively dry. I met with no extensive swamps, nor are the shores of the fresh water lagoons and lakes (particularly abundant near East Point) especially swampy. The lagoons have been made by the damming back of small streams behind the sandbars formed by the wearing away of the bluffs. At Tignish the woods were in patches interrupted by fields, this style of country being characteristic of a large part of the island. It rep-

resents here as elsewhere the spreading of civilization that destroys utterly the forest of its own generation and takes no thought for the possible necessities of the future. Before the woodman's axe, the evergreen forest has melted away in many parts of our continent never to return, its place being taken, as is well known, by deciduous trees, they suffering in their turn, and this process is now well advanced even on Prince Edward Island.

The native trees are chiefly coniferæ and more than nine tenths of them spruce (*Picea nigra* and *P. alba*) and fir (*Abies balsamea*). Among the more abundant deciduous trees are maples (chiefly *Acer saccharinum*), birches (*Betula lenta*, *B. lutea*, and *B. papyrifera*, all in considerable numbers), beeches (*Fagus ferruginea*), and some of the willows and poplars. Of the shrubs the heath family is well represented, especially by the genera *Vaccinium* (blueberries), *Ledum* (Labrador tea), and *Kalmia* (*K. angustifolia*, sheep laurel). Alders are generally distributed. As to the herbaceous plants, they are those of the northern woods and fields. It is said that some plants of the adjacent mainland are not found on the island. In other words, the twenty miles or so of the Straits of Northumberland act as a barrier to the possible tinge of more southern forms, and the same may influence the northward range of certain species of birds more or less common on the mainland. One may find fragrant banks of the tiny, nodding *Linnæa*, pastures red with sorrel (*Rumex acetosella*), swamps blue with iris (*Iris versicolor*), clearings green with coarse ferns, beneath which gray mosses and clumps of the scarlet bunchberry (*Cornus canadensis*) may be found, and the dark evergreen woods are carpeted with the greenest of mosses. There are many other trees and bushes, notably larch (*Larix americana*) and arbor vitæ (*Thuya occidentalis*) which are rather common locally, but they are not especially conspicuous features, and I merely wish to call attention to certain parts of the flora to indicate in a very general way its character. There are many tracts of second-growth, usually almost wholly beech or maple which, if small, are shunned by birds, and nowhere can one wander far without entering tracts of timber, from which perhaps only the larger trees have been culled. When fire runs through timber, dead and blackened trunks are left that in a few years become, by the rotting away of their branches, the monoto-

nous dead stubs of the northern landscape. Prince Edward Island is, however, remarkably free from such tracts, having passed this period of primitive civilization. One way of clearing land, especially if it is covered with second-growth spruce, is to cut down everything and then let fire do its work when the brush is a little dry, so it is no wonder forest fires are easily started. After fire has swept through a clearing, raspberry bushes (*R. strigosus*) and the willow-herb or 'fire weed' (*Epilobium angustifolium*) are certain to spring up, although apparently there may have been none for miles, coarse ferns soon multiply, and in time the old stumps and fallen, half-charred logs are covered with mosses and lichens, while the ground, if not cultivated, is soon hidden by many sorts of plants and grasses. In such spots the White-throated Sparrow and the Slate-colored Junco find their favorite haunts, and here the Hermit Thrush makes its nest near the edge of the woods, and sings from some favorite tree. Perhaps an Olive-sided Flycatcher may be heard whistling from the top of the tallest dead tree to be found in or near the clearing, or a Wood Pewee may wander out from a bit of open woods of mixed growth near by, where also may be heard a Parula Warbler or a Red-eyed Vireo. If maples, birches, and beeches predominate, Ovenbirds will be found, and the larger the growth the more probability there is of finding the Black-throated Blue Warbler. The Winter Wren and the Yellow-bellied Flycatcher abide in the dense evergreen woods along mossy brooks where few other birds disturb the quiet, save perhaps wandering Warblers or Thrushes. In clearings grown up with small spruces Magnolia Warblers always abound, and if these trees are of considerable size there are sure to be Olive-backed Thrushes. Black-throated Green and Myrtle Warblers. The Nashville Warbler is usually found in the detached, ragged bits of mixed woods, which the Magnolia and Myrtle Warblers also frequent, together with Redstarts and Thrushes. Such in brief are some of the characteristic birds of the woods, and such their favorite haunts, though their tastes of course may vary and some, such as the Hudsonian and Black-capped Chickadees, the Woodpeckers, and the Golden-crowned Kinglets, are almost sure to be found in unexpected places.

Then there are damp bushy tracts where the bushes may be waist high and an occasional arbor vitæ or larch rises above the smaller growth. Here one may seek Canadian and Wilson's

Warblers and Maryland Yellowthroats, while swampy alders suggest the probability of finding Traill's Flycatchers and Swamp Sparrows. If a brook passes through the alders, Water-thrushes may be heard, but it is no easy matter to get even a glimpse of them.

The birds of the fields are numerous, the Savanna Sparrow probably outnumbering all the others put together. Vesper Sparrows and Song Sparrows abound, while the Robin and Flicker are more frequently seen in the open than elsewhere. Crows stalk about in every field, though their nests are in the woods. Goldfinches, Purple Finches, Crossbills and Cedarbirds are generally seen on the wing in the open country, and flying higher than the Swallows (Barn, Bank, and White-bellied) which most frequently are noticed skimming along near the ground or over the surface of a sheet of water.

Long familiarity with the notes and habits of the birds of the Maritime Provinces enabled me to accomplish much more than if I had been a stranger to them, and even though my stay was brief, I feel confident that those species that escaped my attention were either exceedingly rare or did not occur in the localities I visited. All males were in full song, and females startled from their nests lost no time in beginning to scold. I was in the field from morning till night, and my gun with its auxilliary was a trusty friend. Of a previous visit to the island in 1876 little need be said, for the egg fever was on me at that time and the finding of a Junco's nest was sufficient to satisfy my ambition for several days.

While in Charlottetown I examined a hundred or more birds stuffed by Prof. S. N. Earle, but unfortunately they lacked data and are therefore of little use in the present connection. From him, however, I obtained much interesting information. Some notes upon the winter birds of the island have been published by Mr. Bain (Auk, II, 1885, pp. 262–267).

I present here a list that embraces only the species that have come under my own observation, but it includes most of the birds that make their summer home on Prince Edward Island, the fauna of which is thoroughly Canadian.

Cepphus grylle. BLACK GUILLEMOT. — The 'Sea Pigeons' used to breed in great numbers in the cliffs at various points along the coast. I have no doubt that they still do so in smaller numbers, although the only positive

evidence I have is the fact that I saw a dozen or more of the birds about a cliff near New London on the north shore of the island, and heard the young 'squealing' in inaccessible crevices. This cliff, extending for perhaps half a mile, is probably the highest on the island, and is almost sheer to the water seventy or eighty feet below. No beach here intervenes between its base and the waves which in times of storm beat so fiercely against it that it is justly dreaded by mariners as one of the most dangerous spots on the north shore of the island. Its crumbling face, to the very brink of which the green fields above extend, affords ledges and seams where the 'Sea Pigeons' find secure nesting places, and are said to be "plenty." I devoted only one day to exploring this locality and did not see many birds. They were in small parties or pairs, floating upon or skimming over the water, or quietly sitting upon some ledge, the white wing-patch conspicuous against the red background of rock as viewed from a boat. Their black bodies were comparatively inconspicuous owing to shadows. At Tignish a boy told me he had found a nest the previous year in the low bluffs of the north shore, and I think they may breed in the high cliffs southwest of North Cape, although I could not make thorough search. I also saw a pair at East Point where again are high cliffs, sixty feet or more in height.

Larus argentatus smithsonianus. AMERICAN HERRING GULL. — A few were seen from time to time, but I could find no evidence that they bred on the island. Birds of such powerful flight might well wander in the course of a day many miles from their breeding grounds.

Sterna hirundo. COMMON TERN. — It is probable that this species, known as the 'Mackerel Gull,' is the only Tern resident during the summer months, and it is abundant at many points, particularly the sandy reaches of the north shore. I visited a colony near Souris July 7, consisting of perhaps seventy-five pairs. Several nests found contained three eggs each, and were the usual depressions in the plains of drifted sand, protected possibly by a few blades of coarse beach-grass and in one case by a few wisps of grass wound round the edge of the hollow. The birds were reserved in their demeanor, but did not hesitate to expose themselves to the danger of firearms when their nests were examined. Their dainty plumage and easy flight always seem out of keeping with their harsh voices. It is pleasant to visit a colony of Terns and realize it has escaped the persecutions of the milliners, for perhaps no one genus of birds has been more thoroughly exterminated in certain sections of our country than has *Sterna*, thanks to Dame Fashion's inexorable decrees. I was told that this species made its appearance each spring with wonderful regularity on the north shore — usually May 22 — and always between May 21 and 24.

Phalacrocorax ———? Two birds were seen at New London, July 2, perched on a cliff white with their chalkings, but they could not be approached. I was told that 'Shags' were often seen on this rock, but were not thought to breed there. Whether *carbo* or *dilophus* it is impossible for me to say.

Anas obscura. BLACK DUCK. — This is the only Duck of whose presence I have conclusive evidence. I saw a brood on a fresh water lake near Souris, and I found dried up on the sand one day the carcass of an adult. In several other localities I heard of nests having been found.

Botaurus lentiginosus. AMERICAN BITTERN. — A tolerably common bird in suitable localities, and known by the name of 'Mud-hen.'

Ardea herodias. GREAT BLUE HERON. — I learned of at least two heronries of this bird, but did not visit them. One near Charlottetown was described to me as containing several hundred birds. The nests were in hard-wood growth, and were warranted to contain young each year by July 4. The Herons were seen at many points on the island, notably along St. Peter's Bay, where I saw upwards of twenty as the train skirted the shore. They paid little or no attention to it, although often less than a gun-shot distant.

Philohela minor. AMERICAN WOODCOCK. — The sportsmen are acquainted with this bird but it is considered rare. I saw a stuffed specimen, and well recollect the one I shot at I don't know how many times when I visited Hunter River in 1876. The country about there is better suited to it than much of the ground visited this time. The partiality of the Woodcock for clean alder swamps still obtains on Prince Edward Island.

Gallinago delicata. WILSON'S SNIPE. — This species breeds, sparingly I fancy, at suitable places on the island. I saw a young bird in first plumage among Prof. Earle's birds and talked with several men who had found nests. The tussocks in boggy places along brooks seem to be the usual site — in one case a nest was found in a bunch of iris.

Actitis macularia. SPOTTED SANDPIPER. — Generally distributed along brooks in the open country and fairly common. A nest was found in an odd situation at Tignish. It was under a decayed log on a boggy slope, and was carefully lined with bits of rotten wood.

Ægialitis meloda. PIPING PLOVER. — Frequented the sandy or gravelly beaches in considerable numbers.

Bonasa umbellus togata. CANADIAN RUFFED GROUSE. — A few only were met with, although said to be abundant. A novel method of hunting them reached my ears. They come out upon the railroad in a certain section to sun themselves, and it is said the sportsman riding to and fro on a track-velocipede shoots them so that sometimes he can pick them up without stopping. I was informed by gunners that *Dendragapus canadensis* does not inhabit the island.

Circus hudsonius. MARSH HAWK. — Birds of this species were occasionally seen, recognizable at long distances by the white bar on the tail. It was almost the only Bird of Prey met with.

Aquila chrysaëtos. GOLDEN EAGLE. — I examined a live specimen in young plumage, captured June 23, in a fox trap set for it, near New London. The man who caught it thought there was a nest near by in a piece of woods, and expected to trap the old birds as well, one of which he had seen. After visiting the locality I am inclined to doubt whether the bird was bred on the island. Eagles are considered rare birds there by all the

people with whom I talked, and probably stray from wilder regions, such, for instance, as Cape Breton.

Falco columbarius. PIGEON HAWK. — A bird that I took to be this species was seen one day. Prof. Earle showed me a stuffed specimen.

Pandion haliaëtos carolinensis. AMERICAN OSPREY. — Seen both at Tignish and Souris in limited numbers.

Coccyzus erythrophthalmus. BLACK-BILLED CUCKOO.— One specimen obtained at Tignish is the only evidence I have of its occurrence on the island.

Ceryle alcyon. BELTED KINGFISHER. — Tolerably common, making its home in holes dug into the sand stratum that overlies the rock of the bluffs along the shores.

Dryobates villosus. HAIRY WOODPECKER. — Occasionally observed. There seemed to be a great dearth of Woodpeckers, the Flicker alone excepted. Dead trees did not abound, still there were a great many of them scattered here and there.

Dryobates pubescens. DOWNY WOODPECKER. — The only birds I chanced to meet were a family at Souris occupying a hole thirty feet from the ground in a dead maple of large dimensions. The locality was a grove of old maples.

Sphyrapicus varius. YELLOW-BELLIED SAPSUCKER. — This species was also unexpectedly rare and seldom met with.

Ceophlœus pileatus. PILEATED WOODPECKER. — Said to have been formerly common. Prof. Earle showed me a stuffed specimen, but I found no other evidence, save hearsay, of its occurrence. No 'mortise holes' were discovered.

Colaptes auratus. FLICKER. — The only abundant Woodpecker, and found everywhere in moderate numbers. June 25, a nest with fully fledged young was examined in the top of a hollow fence post. No excavation had been made by the bird, and the young were entirely exposed to the weather.

Chordeiles virginianus. NIGHTHAWK. — A few were seen almost every day, frequenting the open clearings or sailing high in the air at sunset.

Chætura pelagica. CHIMNEY SWIFT. — Rather rare, and not often seen. In a country where a majority of the houses have but one chimney, and that chimney in use from one year's end to another's, it is not remarkable that the Chimney Swift still nests in its primitive manner in hollow trees, but it is remarkable how soon it takes kindly to civilization when this has advanced to the point of building houses with a spare-room chimney.

Trochilus colubris. RUBY-THROATED HUMMINGBIRD —Not observed, but undoubtedly occurs. Prof. Earle showed me stuffed specimens.

Tyrannus tyrannus. KINGBIRD. — Rather common, and no doubt greatly enjoys life where there are so many Crows to be harrassed.

Contopus borealis. OLIVE-SIDED FLYCATCHER. — One specimen was observed at Souris. Prof. Earle was familiar with it.

Contopus virens. WOOD PEWEE. — Not common, though now and then met with in certain localities.

Empidonax flaviventris. YELLOW-BELLIED FLYCATCHER. — Found only at Tignish and in small numbers. The dryness of the other localities visited would partly account for its absence. The scarcity of this and the following species rather surprised me.

Empidonax pusillus traillii. TRAILL'S FLYCATCHER. — A few at Tignish in their favorite haunts, the alders, were the only ones met with. It is likely that both this species and the preceding are in some other localities more abundant than my observations would indicate.

Empidonax minimus. LEAST FLYCATCHER. — A cheerful series of 'che-bécs' greeted me one morning at Souris. It is really easier to distinguish this bird from *traillii* by its notes than by the bird in hand, but the bird in hand is, unfortunately perhaps, a scientific necessity. No others were seen.

Cyanocitta cristata. BLUE JAY. — Not abundant, and only occasionally met with. No *Perisoreus canadensis* were even heard of.

[**Corvus corax principalis** RAVEN. — I was told that a pair of Ravens had formerly nested for several years on the face of the cliff at East Point, and while I think my informant could have made no mistake as to the species, I hesitate about admitting a bird to the list on hearsay only.]

Corvus americanus. AMERICAN CROW. — Nowhere, in the breeding season, have I ever seen Crows so abundant and so tame. They were never out of sight or hearing, and they sit on the fences and 'caw' at you derisively as you ride by. Of course their numbers were augmented by young birds, and early in July they were beginning to flock, as indicated by a gathering of nearly a hundred seen July 4. At Tignish there was a roost in a large patch of woods, whither towards sundown and later Crows were seen converging from all directions. In the woods a terrible noise was kept up until it grew dark. The Crows do not molest the farmer to any great extent, as he raises no corn, but I was told they kill young chickens and pick out the eyes of new-born lambs. They daily congregate for a feast in the fields where the refuse of the many lobster-canning establishments is used as a fertilizer.

Scolecophagus carolinus. RUSTY BLACKBIRD. — A flock of twenty or more, largely young birds, near East Point July 7, were the only ones seen. I had heard of their occurence elsewhere.

Quiscalus quiscula æneus. BRONZED GRACKLE. — A pair of these birds in Prof. Earle's possession were the only ones he had ever seen, very likely stragglers from the mainland.

Carpodacus purpureus. PURPLE FINCH. — Sparingly distributed, a restless and roving species, and seen singly or in pairs.

Loxia curvirostra minor. AMERICAN CROSSBILL. — Perhaps more abundant than the following species, but the flocks are so often made up of birds of both species, and so much more frequently seen or heard flying overhead rather than allowing a closer examination, that it is difficult to estimate their numbers. At any rate both were occasionally seen in flocks of old and young, sometimes one species predominating (usually the flock was almost entirely made up of one species), sometimes the

other. Although the call notes are quite distinguishable, those of *leucoptera* being harsher, it is no easy matter to determine percentages in chattering flocks of a dozen or more birds. Their favorite feeding haunts were larch trees, and, unless disturbed, they were silent as they hung about the branches in all conceivable attitudes, usually upside down. They also feed on the seeds from the green cones of the fir which are tipped with freshly exuded pitch at this season, if it be a cone year. The pitch often mats on the bills and feathers of the birds. Dissection showed the breeding season to be long past.

Loxia leucoptera. WHITE-WINGED CROSSBILL. — Rather numerous. The remarks made under the preceding species apply also to this. Neither can be seen every day, for both are great wanderers.

Spinus tristis. AMERICAN GOLDFINCH.—A few seen almost daily.

Spinus pinus. PINE SISKIN.—It surprised me to meet with this species but once—a male at Souris. Dissection showed the bird to be breeding.

Poocætes gramineus. VESPER SPARROW.—An abundant bird, frequenting the open fields in the more settled districts.

Ammodramus sandwichensis savanna. SAVANNA SPARROW. — It is probably the most abundant bird on the island, and is found everywhere except in woods. On sand beaches, marshes, or dry fields its weak song was constantly to be heard, and in certain pastures it seemed as if every third fence post were occupied by a singer. As an illustration that flying is a matter of practice on the part of young birds, I instance a young Savanna Sparrow that I flushed one windy day in a pasture where the grass was very short. The wind upset all his calculations and himself as well, apparently getting under his wings and turning him upside down every time he started on a fresh flight. He would get along pretty well for a rod or so and then a puff would send him bowling over the sod till he reached a point of fright and exhaustion that left him panting just where he happened to roll.

Ammodramus caudacutus subvirgatus. ACADIAN SHARP-TAILED FINCH.—A few birds in a salt marsh at Tignish were the only ones I could discover, although I searched in many other localities. As Mr. Wm. Stone found this form abundant at Tignish in 1876 (recorded as *A. caudacutus*, for *subvirgatus* was not then separated, Brewster, Bull. N. O. C., Vol. II, Jan. 1877, p. 28), I was surprised not to find it more abundant. I saw likely ground along East River, but did not have time to explore it, and the birds very possibly may be locally distributed here and at other points also.

Zonotrichia albicollis. WHITE-THROATED SPARROW.—This bird so characteristic of the Canadian Fauna is less abundant than the ubiquitous Junco, but on account of its loud and striking song is far better known to the average inhabitant. It is a bird of the clearings, building its nest upon the ground in a bunch of weeds, and singing nearly all of the time it is not occupied scolding intruders. Its well-known song is easily imitated, and it is amusing to see how angry and excited a male will become if he thinks another has strayed into his own domain. The song

is sometimes heard breaking the stillness of the night, and only those who have passed a night in the northern woods can know how profound this stillness may be. The song has given to the bird many local names wherever it occurs, one of the best known being 'Kennedy Bird.' I heard a new version which credits him with saying 'Good Lord, pity me, pity me, pity me.' When the young get on the wing, the song is less frequently heard. The bird is known to the few French settlers of the island as *rossignol* (nightingale).

Spizella socialis. CHIPPING SPARROW.—Not a common species, and only occasionally observed.

Junco hyemalis. SLATE-COLORED JUNCO.—Next to the Savanna Sparrow this is probably the most abundant bird on the island. It is found everywhere,—in dooryards, open fields, fern-clothed clearings, even deep woods. Its nest is on the ground, preferably under something—the bottom rail of a fence or a hole in some grassy bank. Young were just beginning to fly June 23, and a week later nests with fresh eggs indicated a second laying. Its local name is 'Bluebird,' a strange misnomer, even though *Sialia sialis* does not occur.

Melospiza fasciata. SONG SPARROW.— Very abundant and generally distributed. Mr. Bain states that some winter on the island.

Melospiza georgiana. SWAMP SPARROW.— Rather common in very wet, bushy meadows, with alders here and there, or in open swamps of limited area, such as occur along brooks in cleared country.

Petrochelidon lunifrons. CLIFF SWALLOW.—A common bird, locally distributed, and nesting in colonies under the eaves of barns and houses.

Chelidon erythrogaster. BARN SWALLOW.— Abundant and generally distributed.

Tachycineta bicolor. WHITE-BELLIED SWALLOW.— Fairly abundant, nesting in old Woodpecker holes in clearings, crevices about barns, and the hollow ends of the rails composing the zigzag fences so common on the island. The sudden disappearance of a Swallow as it alighted on a fence was almost startling until I learned that in some deep hollow, decayed out of the heart of an unsplit rail, was a cosy nest of grass and feathers. It was impossible to dislodge the birds that were sometimes out of arm's reach, but several nests examined the last week in June contained young. I have never found this species nesting in such a location before.

Clivicola riparia. BANK SWALLOW.— I perhaps do this species an injustice when I say that it is outnumbered by the Savanna Sparrow and the Junco. I saw colonies of hundreds at several points along the coast, and as every bluff is crowned by a layer of sand, and much of the coast line is a continuous bluff, the Swallows have unrivalled opportunities for nesting places.

Ampelis cedrorum. CEDARBIRD.— Seen now and again, but not common. There is a remarkable similarity between a lisp of this species, a certain note of the Robin, and one of the Hermit Thrush.

Vireo olivaceus. RED-EYED VIREO.—A common and in a few localities an abundant bird, here as elsewhere a tireless songster. It prefers deciduous trees, particularly large maples.

Vireo solitarius. SOLITARY VIREO.—At Souris one day I was attracted by the song of this bird, and soon saw the performer. This was the only specimen observed on the island. I have often met with it on the mainland, and fully expected to find others, as its rich, clear song, disconnected withal in delivery, cannot fail to attract attention.

Mniotilta varia. BLACK-AND-WHITE WARBLER.—Occasionally seen or its 'wiry' song heard, though not very common.

Helminthophila ruficapilla. NASHVILLE WARBLER.—Rather abundant at Tignish and not met with elsewhere. The activity of this bird is highly commendable, unless you are in pursuit of one, when you are not so favorably impressed. Hardly pausing to dash off its lively song, it is one moment at the very top of some tall tree and the next on the ground a hundred yards away where its song breaks forth quite as vigorously. The bird is the embodiment of restlessness.

Compsothlypis americana. PARULA WARBLER.—Infrequently observed and generally in the upper branches of hard-wood forest.

Dendroica æstiva. YELLOW WARBLER.—Rather common and quite as likely to be found among lonely alder thickets as in the trees around houses.

Dendroica cærulescens. BLACK-THROATED BLUE WARBLER.—A few were detected at Souris. I did not see such extensive hard-wood timber anywhere else on the island, and as the species has a decided preference for such localities, its absence elsewhere is perhaps not to be wondered at.

Dendroica coronata. MYRTLE WARBLER.—Common. Their song reminded me of early spring days in lower latitudes. Their favorite haunts were clumps of spruces and firs in partly cleared land.

Dendroica maculosa. MAGNOLIA WARBLER.—This is the characteristic Warbler of the region and is abundantly represented. It is most abundant in low growths of spruces, where the variety of its song is often confusing.

Dendroica virens. BLACK-THROATED GREEN WARBLER.—Abundant at every place visited where the forest was composed of trees of considerable size.

Dendroica palmarum hypochrysea. YELLOW PALM WARBLER.—An incubating female taken at Tignish is the only evidence I have of this bird's occurrence. The locality was damp, cleared ground, growing up with bushes and small larches.

Seiurus aurocapillus. OVENBIRD.—One was noted at Tignish, and a number at Souris in the hard-wood timber. It is doubtless fairly common in suitable localities.

Seiurus noveboracensis. WATER-THRUSH.—A few were met with at Tignish only. It is a species that but for its loud song would easily escape notice. Invariably found along brooks or in their near vicinity.

Geothlypis philadelphia. MOURNING WARBLER.—Apparently rare, though a few were found at Souris in the bushy edges of dry fields adjoining the woods.

Geothlypis trichas. MARYLAND YELLOWTHROAT.—Found sparingly

in the western portion of the island. None were noted at Souris, although I have no doubt they occur there.

Sylvania pusilla. WILSON'S WARBLER.— One specimen was secured at Tignish in an extensive arbor-vitæ and alder swamp. This is a retiring species and is probably not uncommon if particular search be made for it.

Sylvania canadensis. CANADIAN WARBLER. — Rather common about Tignish, but not met with elsewhere, although I have no doubt it occurs in suitable localities.

Setophaga ruticilla. AMERICAN REDSTART. — Abundant. One of its songs might be easily confused with one of *D. maculosa*. The importance of recognizing songs in a region where the denseness of the woods and underbrush renders the sight or capture of the vocalist often well-nigh impossible, is very great, but to depend entirely upon one's ear in identifying birds is a procedure greatly to be deprecated.

Troglodytes hiemalis. WINTER WREN. — Tolerably common in damp woods along brooks, or sometimes in more open localities. On July 6 I met with a family of young birds able to fly. That so minute a bird should produce such a volume of liquid sound is ever to me a source of wonderment. It is often impossible to see the little fellow when he is pouring forth his song right over your head, but those who have ever entered a dense second-growth of spruces, with a wilderness of dead twigs interlacing below, know one of the difficulties that beset the path of the collector in the northern woods.

Sitta canadensis. RED-BELLIED NUTHATCH. — I had about given up seeing this species at all when I came upon several at Souris, probably a family. They feed usually in the upper boughs of spruces, and seldom run up and down the trunks of trees like their white-breasted brethren. They have a nasal cry of one note, uttered with varying intensity, and never rapidly repeated like the other species. Of course I should not venture such general conclusions as these with regard to this species, nor to others, if they were not based upon further observations made elsewhere.

Parus atricapillus. BLACK-CAPPED CHICKADEE. — Occasionally small roving families were encountered, so that it is probably a fairly common species.

Parus hudsonicus. HUDSONIAN CHICKADEE.—Tolerably common, but not attracting attention to itself so aggressively as does *atricapillus*. However, when it does speak out, it always seems to me to make use of the ungrammatical expression 'It's mé-e,' with a good deal of emphasis on the 'me-e.'

Regulus satrapa. GOLDEN-CROWNED KINGLET. — Infrequently observed. Young were on the wing the last of June. It should have proved much more abundant than I found it to be.

Turdus ustulatus swainsonii. OLIVE-BACKED THRUSH. — Very abundant, almost equalling in numbers the Hermit Thrush. They are usually excessively shy and difficult to obtain, although several may be singing

within hearing at the same time. They frequent thick growths of spruces, and from some commanding perch pour forth their rich song. If they become aware of your approach even a gunshot or more away, they dive down into the dense undergrowth, and a few soft alarm notes are the last you hear of them. Squeaking to them will bring them to you for one brief look, which satisfies them, but not you, for they generally see you first and at close range. Sometimes they sing in the thickets of spruces, but are more apt to have a particular perch, perhaps on some towering, dead tree. I heard no songs that I had any reason to suppose were other than true *swainsonii*, for the possibility of finding *bicknelli* or *aliciæ* had to be kept constantly in mind. I found no young, even up to the last day of my stay, but that proves nothing with a bird so retiring. They sang more persistently and in greater numbers in the early morning and late evening hours.

Turdus aonalaschkæ pallasii. HERMIT THRUSH. — Slightly more abundant than the preceding species, and perhaps more generally distributed. The songs and notes of this species have been so frequently confused with those of other Thrushes, particularly with those of the Olive-backed Thrush, that an effort on my part to call attention to the differences that exist between them may not be without interest. The deliberate character of its song is in marked contrast to that of *swainsonii* and its musical ability is more varied. The usual song dies out without the rising inflection of *swainsonii*, and there is a pause after the first syllable, while in *swainsonii* there is no pause and the second syllable is strongly accented, the whole song being quickly delivered. The Hermit Thrush has also a nasal note of complaint in two ellided syllables, a cluck like a Blackbird, and a lisp not unlike a Cedarbird. The nasal note has its counterpart in *swainsonii* which utters a similar, but more liquid note, and the cluck of *pallasii* may be compared with a 'puk' or 'pink' (as near as it can be represented) of *swainsonii*. The lisp is peculiar to *pallasii*, while there is a queer multiple note of soliloquy peculiar to *swainsonii*.

Merula migratoria. AMERICAN ROBIN. — Very abundant in the more open country. An occasional one is said by Mr. Bain to remain through the winter, subsisting on the berries of the mountain ash.

NOTES ON CERTAIN WASHINGTON AND BRITISH COLUMBIA BIRDS.

BY SAMUEL N. RHOADS.

OWING to unavoidable delay in the publication of a complete paper on the birds I observed in Washington and British Columbia in 1892 I am induced to present the following remarks on some of the more noteworthy species. These notes are based for the most part on a collection of birds made during the past spring and summer on Puget Sound, Vancouver Island, and in parts of British Columbia south of the fifty-third parallel between the Rocky Mountains and the Pacific coast. Of the twenty species recorded as new to the fauna of British Columbia a few may be found in Lord's list,[1] but owing to the debatable nature of the territory surveyed by that naturalist and the inaccuracy of many of his statements, we are forced to ignore it in this connexion. Additions to the lists of Messrs. Chapman and Fannin are: —

Simorhynchus pusillus.
Charadrius dominicus fulvus.
Callipepla californica vallicola.
Bubo virginianus.
Bubo virginianus arcticus.
Glaucidium gnoma.
Perisoreus canadensis capitalis.
Chondestes grammacus strigatus.
Zonotrichia querula.
Spizella socialis.
Passerella iliaca schistacea.
Clivicola riparia.
Vireo huttoni obscurus.
Helminthophila ruficapilla gutturalis.
Dendroica maculosa.
Icteria virens longicauda.
Certhia familiaris montana.
Parus hudsonicus columbianus (subsp. nov.).
Turdus ustulatus swainsonii.
Turdus aonalaschkæ pallasii.

Additions to previous avifaunal lists of Washington are: —

Colymbus holbœllii.
Urinator arcticus.
Simorhynchus pusillus.
Synthliboramphus antiquus.

[1] 'Naturalist in British Columbia,' J. K. Lord, Vol. II, Appendix.

Brachyramphus marmoratus.[1]
Cepphus columba.[1]
Uria troile californica.
Larus argentatus smithsonianus?
Larus californicus.[1]
Larus delawarensis.[1]
Larus brachyrhynchus.
Phalacrocorax dilophus cincinatus.
Merganser serrator.[1]
Lophodytes cucullatus.[1]
Anas discors.
Spatula clypeata.[1]
Aix sponsa.[1]
Aythya americana.
Histrionicus histrionicus.[1]
Anser albifrons gambeli.[1]
Branta canadensis hutchinsii.[1]
Branta canadensis occidentalis.[1]
Branta canadensis minima.
Olor buccinator.[1]
Grus mexicana?
Porzana carolina.
Fulica americana.[1]
Tringa canutus.
Totanus flavipes.
Arenaria interpres.[1]
Hæmatopus bachmani.
Oreortyx pictus.[1]
Callipepla californica vallicola.
Dendragapus franklinii.[1]
Lagopus leucurus.
Cathartes aura.[1]
Circus hudsonicus.[1]
Falco peregrinus pealei.
Falco columbarius suckleyi.
Asio wilsonianus.
Syrnium occidentale.
Megascops asio kennicottii.[1]
Dryobates pubescens gairdnerii.[1]
Sphyrapicus ruber.[1]
Cypseloides niger.
Pica pica hudsonica.[1]
Agelaius phœniceus.[1] [2]
Progne subis.[1]
Vireo solitarius cassinii.[1]
Dendroica coronata.[1]
Sitta carolinensis aculeata.
Sitta canadensis.
Parus atricapillus occidentalis.

Simorhynchus pusillus. LEAST AUKLET. — Mr. Jos. Edwards, of the well-known firm of Edwards Bros., taxidermists, of Tacoma, called my attention to the occurrence of a "very small Auklet," a pair of which were seen by his father on Puget Sound during the winter of 1888. One of these was wounded and finally escaped after a very close pursuit by the two men in a canoe.

The diminutive size of this Auklet as compared with *Ptychoramphus aleuticus*, or any other of its congeners known to inhabit those waters, and the great familiarity of Mr. Edwards with these, makes the authenticity of this record almost unquestionable, and extends its winter range several hundred miles south of previous records.

Syrnium occidentale. SPOTTED OWL. — Two Owls (one of which is in the collection), taken by Edwards Bros. twelve miles east of Tacoma, on the western foothills of the Cascades, prove to be almost identical with Xantus's type of *Syrnium occidentale* taken at Fort Tejon, California. In color the Washington specimens agree with the type in being darker

[1] Washington species included in Cooper and Suckley's Pacific R. R. Report of 1860, Vol. XII.

[2] Mistaken for *A. gubernator* by Lawrence, Auk, IX, 45.

and larger than Arizona specimens. The Spotted Owl has heretofore been considered representative of the Lower Sonoran Fauna; that it should thus suddenly appear on the Boreal horizon is somewhat startling.

Bubo virginianus. GREAT HORNED OWL.

Bubo virginianus saturatus. DUSKY HORNED OWL.

Bubo virginianus subarcticus. WESTERN HORNED OWL.

Bubo virginianus arcticus. ARCTIC HORNED OWL. — The distribution of resident and visiting forms of Horned Owls throughout British Columbia is most confusing. I have examined about thirty specimens, representing all localities visited. Of these, six from the region between the Cascade and Rocky Mountains (Ashcroft to Vernon) are almost typical *virginianus;* three from Vernon are as dark as lighter specimens of *saturatus* from the coast, and six others from the same place grade from typical *subarcticus* nearly into *arcticus.* It is probable that two winter specimens in the collection of Mr. W. C. Pound, at Vernon, are *arcticus.*

The presence of individuals so closely resembling *virginianus*, west of the Rocky Mountains, is the most striking example of the frequent reproduction of eastern forms in the northwest I have yet observed. The reappearance of the dark *saturatus* phase upon the well-watered slopes of the Selkirk Range, and their disappearance a few miles farther east on the Rockies, tallies perfectly with the local climatic conditions of those regions. If we consider the extreme susceptibility to environment displayed by certain genera of North American Owls, and their tendency to dichromatic variation, the mixed condition of the *Bubo virginianus* group becomes less puzzling. The occurrence of *saturatus* in Labrador and on the mountain peaks of Idaho and Arizona, as testified by Ridgway and Merriam, is in keeping with my own experience. From such a state of affairs to the voluntary, individual assumption of color characters according with sudden local changes of environment, is a step in development too short to be impossible.

Glaucidium gnoma. PYGMY OWL. — That the California Pygmy Owl of the Pacific slope of British Columbia is sparingly replaced by true *gnoma* in the interior, is shown by several specimens taken by Mr. Pound of Vernon, one of which is in the collection.

Colaptes cafer+auratus. 'HYBRID' FLICKER. — A paper on 'Hybridism as exemplified in the genus *Colaptes*,' in the issue of 'Science' for Dec. 9, 1892, embodies my observations on this interesting group.

Corvus americanus. AMERICAN CROW.

Corvus caurinus. NORTHWEST CROW. — Thirty specimens of Crows from British Columbia and the shores of Puget Sound, Washington, of which fifteen are in the Streator collection and fifteen in mine, give the following measurements (in inches).

	Sex	Wing	Tail	Tarsus	Exposed Culmen
East Cascade region of B. C.	♂	12.45	7.15	2.25	1.72
" " " " "	Juv.	12.30	6.90	2.15	1.60
" " " " "	♂	11.75	6.75	2.25	1.55
" " " " "		11.12	7.05	2.15	1.56
" " " " "		11.75	7.00	2.25	1.75
" " " " "	♀	11.95	6.75	2.12	1.68
West Cascade region of B. C.	♀	11.50	6.65	1.80	1.76
" " " " "	♀	11.00	6.60	1.90	1.70
" " " " "	♂	10.60	5.90	1.90	1.60
" " " " "	♂	12.00	6.80	2.00	1.62
" " " " "	♀	11.00	6.25	2.05	1.62
" " " " "	♂	10.90	6.12	1.80	1.70
" " " " "	♂	10.40	6.62	2.01	
" " " " "	♂	11.00	6.60	1.85	1.60
" " " " "	♀	11.00	6.80	2.00	1.62
" " " " "	♀	11.20	6.50	1.90	1.62
" " " " "	♂	11.15	6.60	1.94	1.70
" " " " "	♀	10.50	5.90	1.89	1.55
" " " " "	♂	11.40	6.30	2.00	1.68
" " " " "		11.40	6.50	1.96	1.68
West Cascade region of Washington		11.50	6.60	1.80	1.63
" " " " "	♂	12.05	6.75	2.16	1.80
" " " " "	♂	11.55	6.80	2.00	
" " " " "	♀	10.65	6.30	2.05	1.50
" " " " "	♂	11.65	6.80	2.12	1.65
" " " " "	♂	11.25	6.25	2.23	1.60
" " " " "	♂	11.75	6.80	2.20	1.55
" " " " "	♂	11.48	7.00	2.14	1.70
" " " " "	♀	11.15	6.50	2.00	1.45
" " " " "	♂	12.12	7.60	2.21	1.77
Average		11.40	6.90	2.00	1.65
Average of *C. americanus* (Eastern)		12.36	7.43	2.27	1.92

Examination of these figures and of the specimens from which they are taken emphasizes the conclusions of Mr. Chapman (based on the Streator series), as given in the Bulletin of the Amer. Mus. Nat. Hist., Vol. III, p. 142. "Coloration is apparently of no diagnostic value — examples which measurements proclaim *caurinus* are as glossy as any of the larger birds, while some of these [larger specimens] are as lustreless as any bird in the series." It is also remarkable that extremes of the series, referable to *caurinus* on the one hand, and to *americanus* on the other, are connected by an unbroken chain of intermediates exhibiting every possible phase of gradation, inhabiting promiscuously certain parts of the same breeding range, and that in three localities the extremes were found paired together.

Dr. Suckley, who was the first to describe the habits of *caurinus*, notices particularly the difference in the voice of the Pacific coast forms from that of the Eastern bird, and, while recognizing that there was a great difference in size among the Crows frequenting Puget Sound, naturally attributed these vocal differences solely to the smaller and more numerous individuals designated as *caurinus*. He failed to see any difference in the breeding habits of the large and small birds. It remained for the imaginative and too superficial naturalist of the International Boundary Commission, Mr. J. K. Lord, to further separate the so-called 'Barking Crow' from its larger associate, by stating that the former, after spending the winter on the coast, retired to the interior to breed, and that it there constructed a domed nest of mud and sticks, etc. On the contrary, I am free to assert that typical specimens of *caurinus* rarely cross the Cascade Range, and more rarely breed there, that they breed as abundantly and in the same manner and situations along the Pacific coast as their larger brethren; that Northwest Crows never build a domed nest, nor, to my knowledge, ever inhabit one, that custom being the peculiar monopoly of the Magpie; and, finally, that the vocal peculiarities of Northwest as distinguished from Eastern Crows are shared equally by great and small birds.

Prof. Baird, in the original description of *C. caurinus*, characterizes it as a "small Crow from the northwest coast," separable from *americanus* by its diminutive size, but differing in no other essential particular of proportions or coloration from *americanus*, and quotes Dr. Suckley regarding its habits, as already given. Baird further shows that *C. ossifragus* is easily separable from both *americanus* and *caurinus* by the relative proportions of tarsus and toes and by the color of lower parts, and raises the question whether *caurinus* is "more than a dwarfed race of the other species," *i. e.* of *americanus*.

Mr. Ridgway, in his 'Manual,' endeavored to formulate characters for *caurinus* which would set at rest any doubts as to its title to specific rank, resting his claim on certain peculiarities of coloration and measurements which the material in my possession proves to be inconstant and valueless. In answer to a letter calling attention to this, he writes: "I had entertained hopes that good characters might be found to distinguish *C. caurinus* as a species, but doubtless you are justified in your failure to find them. Is it not possible, however, that interbreeding of *caurinus* and the western form of *americanus* has caused the state of affairs which you have discovered?"

Summing up the evidence, we have left us barely two alternatives, one the possibility that "*caurinus* and the western form of *americanus*" interbreed in this region and that the intermediates are hybrids resulting from such a union, the other, the probability that *caurinus* is a dwarfed example of the smaller western race which Mr. Ridgway described in 1887 under the name of *Corvus americanus hesperis*, and which, for reasons better known to themselves than to the public, the A. O. U. Committee failed to recognize. A subspecific distinction between the smaller and larger interbreeding Crows of the Pacific coast being a violation alike of good sense

and good rules, it remains to name the British Columbia Crows either *americanus* or *caurinus* according to size, and their intermediates hybrids, or to class all under a common name. I accept the latter as the most simple and reasonable alternative.

The northeastern and northwestern forms of *americanus* may be characterized as follows:

Corvus americanus Aud. AMERICAN CROW. — Wing averaging more than 12.35, tail averaging more than 7.40, culmen averaging more than 1.90, tarsus averaging more than 2.25 inches. Plumage black, glossed with violet reflections; lower parts jet black, glossed like upper parts on neck and breast, and fading into the plain black of belly. Larger and more glossy; length 17.00–21.00, wing 11.90–13.25 (12.36), tail 6.90–8.00 (7.43), exposed culmen 1.80–2.05 (1.92), tarsus 2.20–2.40 (2.27)[1] inches. Habitat: Eastern North America, except southern Florida.

Corvus americanus caurinus (Baird). NORTHWEST CROW. — Wing, tail, culmen and tarsus measurements always (?) less than their average measurements in *americanus*. Plumage black, with violet reflections, rarely decided as in *C. americanus*, nor as constant on lower as on upper parts. Violet of upper parts generally confined to the crown, scapulars, quills, and wing-coverts, with hind neck and interscapular region duller or lacking any gloss. Smaller and less glossy; wing 10.40–12.45 (11.40), tail 6.12–7.60 (6.90), exposed culmen 1.55–1.80 (1.65), tarsus 1.80–2.25 (2.00) inches. Habitat: Northwestern North America west of the Rocky Mountains.

Melospiza lincolni. LINCOLN'S SPARROW.

Melospiza lincolni striata. FORBUSH'S SPARROW. — A comparison of six specimens from Vancouver Island, five from the interior and four from the mainland coast of British Columbia with two from Pennsylvania, three from Mexico, two from Iowa, and one from Fort Simpson, may be thus summarized: Vancouver Island specimens (including two from Comox, the type locality) are not more "olivaceous" on superciliary stripe than those of same season from any other locality. Black markings on back not darker than in specimens from Orizaba, Fort Simpson, or the interior of the British Columbia mainland, nor darker on throat than skins from the interior. In all deference to its describer and the verdict of our committee on nomenclature, I consider *M. lincolni striata* less entitled to recognition than certain subspecies once included, but now stricken from the Check-List.

Vireo gilvus swainsonii. WESTERN WARBLING VIREO. — Warbling Vireos from west of the Rocky Mountains have caused trouble ever since Baird suggested their specific separation from *V. gilvus* under the name *Vireo swainsonii*. Coues and Ridgway recognize them as a subspecies of *gilvus*, the latter giving their habitat as west of the Rockies, but, as is well known, the race finds no place in the A. O. U. Check-List. Swainson's type came from the Columbia River, probably east of the Cascades, but

[1] These measurements of *americanus* are taken from Ridgway's 'Manual.'

the material on which Baird's proposed separation rests is five specimens from the Pacific slope, three of which were obtained at Steilacoom, Washington. The type locality being in the northwest, this race can be ignored only on a comparison of series from this region with Atlantic coast specimens. Owing to the scarcity of specimens from Washington or British Columbia this has heretofore been impossible. The subjoined table supplies the necessary information. The measurements (which are in inches) are all my own and are taken only from skins collected by Mr. Streator and myself in the respective districts named.

	Wing	*Tail*	*Bill from nostril*	*Tarsus*	*Wing*	*Tail*	*Bill from nostril*	*Tarsus*
	Vancouver Island.				West Cascade Slope.			
	2.63	2.00	.27	.62	2.55	1.85	.27	.61
	2.63	2.08	.27	.60	2.64	2.00	.28	.74
	2.58	1.88	.27	.62	2.62	2.05	.27	.64
	2.62	2.00	.27	.63	2.62	1.98	.27	.65
	2.62	1.89	.27	.62	2.60	1.98	.27	.70
	2.65	2.00	.28	.62	2.66	2.00	.28	.63
	2.60	1.99	.26	.63	2.60	1.95	.27	.66
	2.63	1.95	.30	.63	2.65	2.00	.28	.75
Average,	2.62	1.97	.27	.62	2.62	1.97	.27	.67
	East Cascade Region.				Atlantic Coast.			
	2.66	2.02	.28	.65	2.85	2.12	.28	.64
	2.60	1.97	.27	.67	2.67	2.13	.28	.72
	2.60	1 90	.28	.65	2.73	2.10	.34	.65
	2.75	2.08	.29	.63	2.84	2.20	.31	.69
	2.62	2.00	.27	.61	2.82	2.15	.32	.66
	2.55	1.95	.27	.61	2.70	2.03	.34	.65
					2.75	2.01	.32	.66
Average,	2.62	1.99	.28	.64	2.80	2.12	.33	.70
Atlantic Coast averages,					2.77	2.11	.31	.69
Northwest averages,					2.62	1.97	.27	.64
Differences,					.15	.14	.04	.05
Ridgway's averages (eastern).					2.84	2.22	.31	.70
" " (western).					2.69	2.14	.30	.68
Differences,					.15	.08	.01	.02

It will be seen that Northwest skins average about .15 inch larger in length of wing and tail, .04 in bill and .05 in tarsus measurements. These marked differences are of themselves sufficient to make *swainsonii* more distinctly subspecific than many other western forms of eastern species

included in the Check-List; add to this the difference in average coloration of upper parts between Pacific and Atlantic coast specimens and we have all that conservatism can ask. When, however, we include, in a comparison between east and west specimens of *gilvus*, skins from all localities over their respective habitats as defined by Mr. Ridgway, these differences are so diminished that the separation of the two forms becomes questionable. It will be impossible to assign hard and fast lines for the habitat of *swainsonii*. The southern Rocky Mountains furnish many specimens of an intermediate character in color, which are nearly as large as *gilvus* while those of the north are quite distinct across the entire territory west of the Rockies.

For the present it will suffice to include British Columbia, Washington, Oregon and northern California in the habitat of *Vireo gilvus swainsonii*.

Vireo huttoni obscurus. ANTHONY'S VIREO.—This may be considered a rather rare visitor on Vancouver Island. I secured one near Victoria. This specimen, also two secured on the same spot by Mr. Maynard in 1891, and which I had the privilege of examining, belong to the strongly characterized race of *Vireo huttoni* proposed by Mr. A. W. Anthony in 1890. Mr. Anthony's specimens were taken in northwestern Oregon. Those above mentioned considerably extend the habitat of *obscurus* and make it probable that it will be found much farther north.

Sylvania pusilla. WILSON'S WARBLER.

Sylvania pusilla pileolata. PILEOLATED WARBLER.—The differences in coloration between Vancouver Island, Rocky Mountain, Iowa, and Pennsylvania specimens of these forms, as given in the books, is in many cases entirely contradicted by the series in my possession. Examples may be selected from extreme east and west points which defy the most critical eye to detect a difference, save perhaps in the intensity of yellow on the forehead, while darkest eastern specimens may be perfectly matched by skins from Vancouver Island. Comparative measurements are of no value, the average differences between *pusilla* and *pileolata* given by Mr. Ridgway being only .01 inch each in lengths of tail and wing, nor is the comparative color of bill of constant value in the series before me.

If this series may be taken as a criterion of the status of *S. pusilla pileolata*, it has no better claim to recognition in our nomenclature than the late *Dendroica æstiva morcomi*.

Parus hudsonicus columbianus SUBSP. NOV. COLUMBIAN CHICKADEE.—Four specimens of *Parus* from the central Rocky Mountains near Field, British Columbia, taken in a deep forest at an elevation of 5000 feet, differ so materially from *Parus hudsonicus* that it seems proper to separate them. Measurements and coloration of these with those of a series of forty New York, Ontario, Labrador, Great Slave Lake and Alaskan skins, loaned by the Smithsonian Institution, have been taken, and the following characters noted.

SUBSP. CHAR. (Type, No. 3078, ♂, coll. S. N. Rhoads, Field, B. C., Aug. 30, 1892). — Colors much darker throughout. Black of throat jet, without sooty suffusion, its posterior border abruptly defined and lacking

invasion of white tips seen in *hudsonicus*. Bill black, lacking any tinge of brown. Brownish loral area of *hudsonicus* replaced by sooty black and connected by a distinct frontal band of same color. Crown and hind neck slaty drab with brownish tinge obsolete or barely perceptible. Back, rump, and tail-coverts grayish brown as in *hudsonicus*. Wings and tail darker slate gray, the former without the brownish or grayish tips always (?) present in *hudsonicus* and *stoneyi* (?). Sides and flanks chocolate (nearly blackish) brown.

Comparative average measurements in inches of adults are subjoined.

	Wing	*Tail*	*Ex. Culmen*	*Tarsus*
Parus hudsonicus.	2.58	2.55	.27	.61
Parus hudsonicus stoneyi.	2.55	2.60	.31	.64
Parus hudsonicus columbianus.	2.70	2.64	.32	.67

Should a more complete series of *columbianus* prove the constancy of the characters given above, it may be found to merit specific rank, but as the case now stands a humbler position is more tenable.

Regarding the status of *P. hudsonicus stoneyi* in this connexion, we are at much loss because of the scarcity and bad condition of specimens, which also lack data. In size *stoneyi* does not greatly exceed *hudsonicus* except in bill measurements which nearly equal those of *columbianus*. Lighter specimens of *hudsonicus* from Ungava, Labrador, differ but slightly in color from *stoneyi* while the differences between these and *columbianus* are striking.

Mr. Ridgway has suggested to me the propriety of going thoroughly over the whole ground in question. With this in view I would ask the loan of specimens of *Parus hudsonicus* from all parts of its known habitat. Such of these as may be sent to the Academy of Natural Sciences of Philadelphia will be thankfully received and cared for.

Turdus aonalaschkæ pallasii. HERMIT THRUSH.—The presence of this species breeding in the region around Lake La Hache, B. C., as attested by four skins in the collection, further complicates the relationships of this genus in the Northwest. Neither *audubóni* nor *pallasii* was found in any other part of British Columbia. I found *aonalaschkæ* breeding in the Rocky Mountains at Field. It is doubtful if *audubóni* reaches the forty-ninth parallel. If, as seems probable, it be found that *pallasii* and *aonalaschkæ* breed indifferently across common ground in the central and Rocky Mountain regions of British Columbia, without the intervention of intergrades, a more definite separation of the two is necessitated. Owing to the limited series obtained in evidence of this, a satisfactory conclusion cannot now be reached. Two points at least are established; first the breeding of *aonalaschkæ* in the Rocky Mountains; second, the breeding of *pallasii* west of the Rockies and south of the fifty-second parallel.

OBSERVATIONS ON THE KNOT (*TRINGA CANUTUS*).

BY GEORGE H. MACKAY.

THIS bird, which formerly sojourned on these shores in great abundance, and occurs now to a limited extent during its migrations, has been the subject of considerable inquiry as to the cause of its appearing now in such reduced numbers. As each contribution to the subject may add something in assisting correct conclusions I have ventured to present the following résumé, especially of the habits and movements of this bird during its short stay in Massachusetts while on migration. The Knot, Red Breast, or Robin Snipe, is cosmopolitan in its migrations, visiting various portions of either hemisphere. Little is known, however, of its breeding places, and authentic eggs are almost entirely unknown in collections. Lieut. Greely is reported to have discovered an egg with the bird in the vicinity of Fort Conger, in Lat. 81° 33′ (Auk, II, 313). It has been found breeding along the shores of Smith's Sound and the north coast of Grinnell Land. Sabine in 1820 found it nesting in great numbers on Melville Island, and in Parry's first voyage he found it breeding on the North Georgian Islands. Capt. Lyons also in 1823 found it breeding on Melville Peninsula. On July 30, 1876, Mr. Henry W. Fielding noted an old bird with three nestlings at Knot Harbor, Grinnell Land (Baird, Brewer and Ridgway, Water Birds, Vol. I, p. 214). On the west coast of the Pacific it migrates as far south as Australia and New Zealand to winter, passing Japan and China. It also winters in Damara Land, Africa, and in America has been taken as far south as Brazil. The American bird differs only in size from the Japanese bird (*Tringa crassirostris*), which is larger (Seebohm's Plovers, pp. 421, 424). It is abundant during migrations on the coast of British Columbia ('Check List of British Columbian Birds,' by John Fannin). Mr. Ernest E. Thompson ('Birds of Manitoba') also notes it as a spring migrant in Manitoba. Messrs. Sclater and Hudson make no mention of it in their 'Argentine Ornithology,' so if it reaches the southern portion of the South American continent it has escaped their observation.

In Massachusetts the adult birds first make their appearance from the middle to the last of July on their southern migration, the height of their abundance being about the first of August; the latest I have heard of the adults being taken (an adult male) was October 6, 1887, at Monomoy Island, Cape Cod, with two exceptions, when on Dec. 28, 1879, during a thick snowstorm, Mr. Lorenzo Hamilton of Chatham, Mass. (now living at Billingsgate), shot eight old, deep red-breasted birds near Chatham Light from a flock of twenty, all of which had deep red breasts. On Feb. 22, 1892, he also shot two old deep red-breasted birds (all there were) at Billingsgate, Cape Cod. The young gray-and-white birds appear while making their southern migration during the latter part of August to September 10; and the latest I have heard of their being taken was October 5; they generally move south late in September.

In the spring during migration northward some few early birds appear about May 12, and they continue coming, and remain until the first week in June, when all the birds have passed north. I have known of good shooting on June 3, but the height of abundance used to be the last few days in May. The most favorable time to expect them at this season is during fine, soft, south to southwest weather, and formerly they could be expected to pass in numbers between May 20 and June 5. In former times, when such conditions prevailed, thousands collected on Cape Cod, when they would remain from a few days to a week before resuming migration.

That the Knot can withstand our winter climate is shown by the fact that I shot on a shoal adjacent to Muskeget Island, Mass., on March 19, 1890, two Knots, one of which (a male) was saved and is now in the collection of Mr. William Brewster. There had been three in all, and they were all in the gray and white plumage; the one skinned was very fat. The day on which I shot them the most severe northeast snowstorm of the winter prevailed. They had been living in this locality the greater portion of the winter, being observed from the middle of January up to the time they were shot. I was informed, however, that none had been noticed in this locality at this season before. On January 12, 1879, Mr. Outram Bangs of Boston noticed a female in the gray and white plumage hanging in a bunch of Purple Sandpipers (*Tringa maritima*) in a stall in Faneuil

Hall Market, Boston. On inquiry, after purchasing the bird, which is now in his collection, he learned the bunch of birds came from St. John, New Brunswick, and the Knot probably was shot in that locality about that date.

The Knot is a favorite bird with sportsmen, on account of its answering the call whistle and coming to the decoys so readily, often a second and occasionally a third time, after having been shot at, for they are either very tame or very shy according to whether they have been harassed. When shy, and coming to decoys to alight, they barely touch their feet to the sand before they discover their mistake and are off in an instant. They fly quickly and closely together and, when coming to decoys, usually pass by them down wind, most of the flock whistling, then suddenly wheeling with heads to the wind, and up to the decoys. At such times many are killed at one discharge. They are only fair eating, being a little fishy in flavor. They make two notes. One is soft, of two articulations, and sounds like the word 'Wah-quoit' (by which name it is sometimes known on Cape Cod); although uttered low it can be heard quite a distance. This note is particularly noticeable when flocks are coming to the decoys; it has a faint rolling sound similar to the note of the American Golden Plover (*Charadrius dominicus*) under the same conditions, only more subdued and faint. The other is a single note resembling a little honk. These birds will also respond to the note of the Black-bellied Plover (*Charadrius squatarola*) as readily as to their own, when it is given with a whistle.

Knots feed on the marshes and also on the sand flats near the edge of the water, where they find marine insects and their larvæ. Those birds living south of Cape Hatteras feed to a large extent on a small mollusc (*Donax variabilis* Say). They also frequent the flats at night as well as in the daytime. As far as I know I should say their food was the same as that eaten by the Black-bellied Plover. Like them they also eat the larvæ of one of the cut worms (Noctuidæ) which they obtain on the marshes, and some of which I have found still in their throats after they were shot. Mr. William Thompson in his most charming work ('Natural History of Ireland') mentions that there they feed chiefly on minute mollusca, especially *Paludina muriatica* Lam., also on the young of *Littorina rudis*. On the ground they are sluggish, and not given to moving about much; unless

very much harassed they are not nearly so vigilant as their companions, the Black-bellied Plover, but when they have become shy they are exceedingly wary and always on the alert for danger.

When the incoming tide drives the Knots from the flats they seek the marshes, or some shoal which is sufficiently elevated to remain uncovered during high water; they also frequent the crest of the beaches. Here they generally remain quiet until the tide has fallen sufficiently to permit them to return again to the flats to feed. When on the marshes during high water they occupy some of the time in feeding, showing they are by no means dependent on the flats for all their food. They associate and mingle as freely with the Turnstone (*Arenaria interpres*), Black-bellied Plover (*Charadrius squatarola*), and Red-backed Sandpiper (*Tringa alpina pacifica*) as with their own kind, and apparently evince the same friendship toward the two former birds as prevails between the American Golden Plover (*Charadrius dominicus*) and the Eskimo Curlew (*Numenius borealis*). I have heard of but one instance (at Revere, Mass., during a storm) of the Knot being noted in the same flock with adult American Golden Plover. At this time there were three, one of which was shot. I have heard, however, of both adult and young Knots mingling with young American Golden Plover, or 'Pale-bellies,' as they are locally called.

For twelve years past the number of Knots in the spring in the vicinity of Tuckernuck Island has not averaged more than fifty birds, so I am informed on good authority. At this season they sometimes frequent the upland on the island in company with the Turnstone, never doing so, however, in August or September. From the time they are first noted at this latter season they seem to come along quite continuously a few at a time until migration ceases. Knots as a rule are not in the habit of frequenting uplands as they do the marshes. I account for their doing so in this instance in the spring by the fact of there being no marshes in the vicinity, and by their being mingled with the Turnstones which are in the habit of frequenting such places. They are induced in consequence to follow the Turnstones where they lead, this bird showing more determination of purpose than the Knots which frequently yield and follow them. This is not the case with the Turnstones; they often leave the combined flock rather than be led where they do not care to go.

On the Dennis marshes and flats, at Chatham, the Nauset, Wellfleet, and Billingsgate, Cape Cod, and on the flats around Tuckernuck and Muskeget Islands, Mass., they used to be more numerous than in all the rest of New England combined, and being very gregarious they would collect in those places in exceedingly large numbers, estimates of which were useless. This was previous to 1850 and when the Cape Cod railroad was completed only to Sandwich. Often, when riding on the top of the stage coach on the Cape beyond this point, immense numbers of these birds could be seen, as they rose up in clouds, during the period that they sojourned there. It was at this time that the vicious practice of 'fire-lighting' them prevailed, and a very great number of them were thus killed on the flats at night in the vicinity of Billingsgate (near Wellfleet). The mode of procedure was for two men to start out after dark at half tide, one of them to carry a lighted lantern, the other to reach and seize the birds, bite their necks, and put them in a bag slung over the shoulder. When near a flock they would approach them on their hands and knees the birds being almost invariably taken on the flats. This practice continued several years before it was finally prohibited by law. I have it directly from an excellent authority that he has seen in the spring, six barrels of these birds (all of which had been taken in this manner) at one time, on the deck of the Cape Cod packet for Boston. He has also seen barrels of them, which had spoiled during the voyage, thrown overboard in Boston Harbor on arrival of the packet. The price of these birds at that time was ten cents per dozen; mixed with them would be Turnstones and Black-bellied Plover. Not one of these birds had been shot, all having been taken with the aid of a 'fire-light.'

As they appear on our shores each season at about the same date as the Black-bellied Plover, which, however, they formerly always greatly outnumbered, I venture to suggest for the Knots the same possibility of a change of habitat and of lines of migration that I did when considering the cause of that bird's lessened numbers (Auk, IX, 143). I consider the case of the Knots a much more aggravated one than that of the Black-bellied Plover, the Knots having been reduced to a much greater extent in my opinion by having been killed. Besides those destroyed on Cape Cod through the agency of 'fire-lights,' I have reasons for believing that they have been shot also in large numbers on the

Atlantic seaboard (Virginia) in the spring on their way north to their breeding grounds, one such place shipping to New York City in a single spring, from April 1 to June 3, upwards of six thousand Plover, a large share of which were Knots. This was about thirty years ago, but it nevertheless serves to illustrate what kind of treatment these birds received in those days, as well as since, and bears out the current belief of today that the Knots in a great measure have been killed off. In more recent times we find every locality along the shore, where shooting can be obtained, accessible at short notice to sportsmen, who are ever ready to avail themselves of weather conditions likely to land birds; and should any arrive, they are immediately pursued, and those not killed are driven away. Therefore as passing flocks receive no answer to their call of inquiry, and as those birds which have been over the same route a number of times before (having become leaders of migratory flocks) have learned what invariably awaits them in certain localities, the remnants of the once large numbers pass on, carrying their companions with them, being unwilling to risk the death or persecution that awaits them at all times; for there is never any cessation.

It is not my intention to convey the impression that the Knots are nearly exterminated, but they are much reduced in numbers, and are in great danger of extinction, and comparatively few can now be seen in Massachusetts, where formerly there were twenty to twenty-five thousand a year, which I consider a reasonable estimate of its former abundance. Mr. S. Hall Barrett informs me that he has not shot a single old red-breasted bird for the past five years on Cape Cod, although he has been on the ground that they would frequent during the proper season for them to pass, but he has seen about one hundred young, gray-and-white birds a year. His place of observation was Billingsgate Light House, one of the best places for such birds on Cape Cod. In old times he has seen as many as twenty-five thousand birds (estimated) in one year. On the other hand, Mr. C. L. Leonard of Marshfield Hills, Mass., informs me that on Cape Cod, generally near Barnstable, he sees annually about one hundred adult birds with full red breasts (and takes more or less of them), and about one thousand young gray and white birds, from their first arrival until October. This gentleman also informs me that he does not believe after his past fifteen years' experience that these birds

ever change back to the gray and white plumage of the younger birds after once attaining the adult full plumage of brick red on the underparts.

They are still found in greater or less numbers along the Atlantic coast south of Chesapeake Bay. Near Charleston, S. C., Mr. William Brewster noted about one hundred and fifty Knots on May 6 and 8, 1885, and saw a number of flocks on May 13. They were flying by, or were alighted, on Sullivan Island beach. On May 17, 1883, he noted about one hundred of these birds in the same locality. In the spring they pass Charlotte Harbor, Florida, so I am informed, in large numbers, coming up the coast from the south (a flight on May 26, 1890), at which time they are very tame. They are also more or less numerous near Morehead City, North Carolina (where they are known as 'Beach Robins'), from May 15 to 30, their flight being along the beach, just over the surf, at early morning, coming from the east in the neighborhood of Point Lookout, ten or twelve miles away, where they probably resorted to roost. This indicates that these birds were living in that locality. As late as twelve years ago I understand from very good authority that Knots were abundant from May 20 to June 1 on the Magdalen islands. During spring when they were on migration they used to be abundant on Lake Ontario, but I am not in possession of any late data regarding their movements at that point.

To me the Knots are very handsome birds in the full adult plumage; their red, Robin-like breasts and lower parts with their reddish-and-black-spotted backs, make a soft blending of color most pleasing to the eye. The plumage of the female, on the back, is sometimes duller and with less red than in the male, often without any red. It is from their resemblance to the American Robin (*Merula migratoria*) that their local names of Robin Snipe and Beach Robins (the latter on the North Carolina coast) have been given them. The plumage of the young birds (sometimes called 'Whitings' on Cape Cod, and which are usually smaller than the adults) is of a general slate gray for the upper parts, and white underneath, with neck, breast, and sides streaked with fine slate-colored lines. This is so unlike the plumage of the old birds that they are often mistaken for a different species by those not familiar with them.

I desire to call attention to the universal statement current in

the literature of the subject that the adults assume what is designated as the winter plumage, that is, gray above and white underneath, similar to the plumage of the young birds. I can but believe that such statement is an error of long standing, it being my conviction that such gray and white plumage is confined exclusively to the younger birds, and is retained by them in varying stages up to three or four years of age, or in other words until such time when they change it (never to reappear in it) for that which is known as full spring plumage. I have yet to see what I understand to be an old bird, from any locality in any season, in the gray and white plumage. Lest I may be misinterpreted, permit me to add that as these birds do not, in my opinion, reach the height of their plumage until they are three or four years old my remarks apply only to birds of that age or over. Mr. Geo. A. Tapley of Revere, Mass., who is a close observer and has shot as many of these birds as any one in Massachusetts, and whose shooting experience extends over a period of about fifty years, informs me that he has in the past shot in every year a good many old birds in full plumage on Cape Cod, Mass., in August and September. He says he never saw what he calls an old bird in the gray and white plumage. Mr. S. Hall Barrett of Malden, his fellow sportsman and of the same number of years' experience, reiterates Mr. Tapley's statements, and I am myself in full accord with both. Owing to the variation of plumage a large series of these birds is imperative in order to arrive at satisfactory results.

After examination of thirty-eight specimens of adult Knots, twenty-four of which were females, I came to the conclusion that there is no constant feature in the plumage of either sex, whereby they can be distinguished one from the other by the ordinary observer, both sexes varying considerably. Some of the females have no red on the back and scapulars, others have a little, and still others as much as the males. In this respect the males are much more constant in their plumage than the females appear to be. In size both sexes are apparently alike. The lower parts of adult birds of both sexes, from the bill to the abdomen, are of a dark vinaceous cinnamon varying in intensity. An examination of eighteen specimens of what I understand as the younger birds, shows their upper parts to be, in general, gray, with the neck, breast, and sides gray, streaked with V-shaped

lines or marks; the lower parts and abdomen are white. This stage of plumage seems constant with only a slight occasional variation. I cannot say as much, however, for the plumage of the older birds. A considerable portion of these young birds are smaller, while some are about the same size as the adults.

Full-plumaged specimens of the Knot are even now not easy to obtain in New England, and the day is not far distant, if it is not already here, when the fine series belonging to Mr. William Brewster will be a prize indeed. To him I am much indebted for their use, also for being able to refer to several of them which, while they are not all I could desire as regards dates of capture, are, together with a few others I have, the best I am able to obtain at this time, to illustrate the point at which I take issue. If the old birds migrate north in June, in their full spring plumage, when they return from the middle of July to September they would have changed, I should suppose, at least in part, if the old statement is correct, into the so-called winter plumage of gray above and white underneath. How is it, then, that sportsmen who have shot these birds all their lives have been able to take so many in full adult plumage on Cape Cod in July, August, September, and occasionally in October? The following specimens are in Mr. Brewster's collection. No. 18,945 is a male, but not an old bird, taken Oct. 6, 1887, at Monomy Island, Cape Cod, by J. C. Cahoon. The breast and lower parts of this bird are washed with pale cinnamon red. No. 19,188, taken at same place by same collector, is a rather young bird with only a cinnamon shading on breast and lower parts. No. 12,727, a male taken at Shelter Island, N. Y., Sept. 6, 1883, is quite an old bird and has considerable cinnamon red on breast and lower parts. No. 1363 (Bangs collection), a young bird taken at Isles of Shoals, Aug. 24, 1877, has only a few red feathers on the breast. The Smithsonian Institution has a female, No. 78,419, taken Sept. 1, 1879, at Big Pass, Florida, which has the entire lower parts, including throat, pale cinnamon red; it is not an adult, however. I have an adult male taken by N. E. Gould on July 15, 1889, at Chatham, Mass.; the entire lower parts from the bill are of a clear deep vinaceous cinnamon. without a white feather. I have a specimen collected by J. C. Cahoon, July 30, 1886, on Cape Cod; it is an adult female with lower parts cinnamon red from base of bill, with a few white feathers intermixed.

I have also a male taken Aug. 17, 1889, by N. E. Gould on Cape Cod; the whole lower parts of this bird from the bill to the abdomen are cinnamon red. Mr. Henry W. Abbot and Mr. Richard D. Ware, of Boston, visited the Magdalen Islands the past summer. On Aug. 23, 1892, they shot a full-plumaged Knot; on Aug. 30 two more were obtained with full red breasts and mottled backs; on Sept. 5 still another full-plumaged bird was taken. There were in addition two or three others in similar plumage which they secured, but for which the exact dates cannot be fixed. In Mr. Brewster's collection are six Knots all of which were shot on May 11, 1885, in South Carolina; one of them is all gray above and white underneath; one is of a deep vinaceous cinnamon on the underparts from the bill to the abdomen; and four are in varying stages of plumage between. It is an interesting little group, showing the development of plumage, on the same date, of birds of different ages.

I append some notes taken by an old shooting friend, Mr. Augustus Denton, which he gave me in 1877; those for the last five years are my own. They are for Cape Cod, Mass., unless otherwise specified. They serve to indicate the movement of the Knots northward in the spring.

1858, May 27.— First birds shot; most on the 31st.

1859, 1860.— Practically the same as above.

1861, May 27.— First birds shot.

1862.— Very few birds.

1863, May 27.— First birds shot.

1864, May 27.— First birds shot.

1865, May 26.— First birds shot. Some birds in August, shot 26 this month.

1866.— Very few birds.

1867, May 27.— First birds shot; most on the 29th and 31st.

1868, May 23.— First birds shot; most on the 27th to 30th.

1869, May 27.— First birds shot, only very few birds.

1870.— Law prohibiting shooting in the spring.

1871, May 17.— First birds shot, earliest I have ever known them to appear, best shooting up to the 20th. A good many birds in August. Law prohibiting spring shooting repealed.

1872, May 25.— First birds shot, numerous this year.

1873, May 19.— First birds shot, abundant until the 31st.

1874, May.— Best shooting up to the 29th. Few birds in August.

1875, May 14.— First birds shot, best shooting 29th. Few birds in August.

1876, May 20.— First birds shot, best shooting on the 26th.

1877, Sept. 28.— Shot one on Nantucket Island, Mass.

1884, Aug. 25.— Shot two on Nantucket Island.

1891, about Aug. 20.— Twenty shot on Tuckernuck Island, Mass.

1891, Sept. 7.— Quite a flight of young birds passed Essex, Mass.; wind northeast with rain, storming hard.

1892, May 11.— Tuckernuck Island, first birds seen (three). June 1, seven seen (adults). Aug. 2, Muskeget Island, Mass., I saw eight Knots, and shot one which had some red feathers on the breast, and was very fat. Aug. 3, Muskeget Island, saw one, with an apparently full red breast, but failed to secure it.

SUMMER BIRDS OF INDIANA AND CLEARFIELD COUNTIES, PENNSYLVANIA.

BY W. E. CLYDE TODD.

WHEN we come to examine and compare the summer birds of Beaver, in Beaver County, Pennsylvania, with those found at that season in the Buffalo Creek region of Butler and Armstrong Counties, about forty miles directly to the eastward, a striking difference at once becomes apparent. This difference consists in the entire absence or rarity in the latter locality of a number of more or less typical Carolinian species which are characteristic birds at Beaver, and in the infusion instead of certain Alleghanian and Canadian forms. As might be expected, there is a corresponding difference in the flora of the respective sections, which is especially marked in the character of the forest, coniferous trees of three species,—white pine (*Pinus strobus*), pitch pine (*Pinus rigida*), and hemlock (*Tsuga canadensis*),—which are rather local and not common in Beaver County, predominating in the other locality. But it is to be observed that this preponderance of conifers exists only in the vicinity of streams, the higher upland forests differing little, if at all, from those of like situation in Beaver County, though here and there a solitary conifer may be found.

In order to investigate the country still farther to the eastward, in Indiana County, I spent four days, June 22 to 25, 1892, in this

region, my stopping-place being a farmhouse two miles east of the village of Two Lick, on Two Lick Creek, a few miles south of the town of Indiana and near Chestnut Ridge. This ridge is the most western range of the Appalachian chain in Pennsylvania, entering the State from the south about the middle of the southern boundary of Fayette County, and terminating a short distance east of the place of my observations. At this point it becomes nothing more than a series of broken ranges of high hills, which to the northward finally disappear into the general level. The elevation for this part according to the contour map of the U. S. Geological Survey is 1500 feet, but there is good reason for believing that to the southward the Ridge attains a height of 2000 feet, since the town of Ligonier, situated east of the range, in Westmoreland County, is known to be 1748 feet above tide.

I found this locality far poorer in conifers than the Buffalo Creek region which I had just left, and I was told that they predominated only in the northern and eastern parts of the County, Pine Flats, fourteen miles east from Indiana, being said to be the western limit of their abundance here. No pines at all were discovered, and the hemlock was confined to the bottom lands of Two Lick and Yellow Creeks, and even there it occurred only at intervals. However, where it was found at all it was very often to the almost complete exclusion of other forest trees. Progress through such gloomy tracts of woods would have been practically out of the question had it not been for an occasional cattle-path or a small stream flowing through the midst, so dense were the thickets of laurel (*Kalmia latifolia*) and rhododendron (*Rhododendron maximum*) beneath. This growth, as well as that of the hemlocks, often extended a short distance up the adjoining hillsides, especially if they were steep and had a northerly exposure, though the laurel in places composed thickets by itself, while the rhododendron was not found outside the shade of the hemlocks.

These tracts of hemlock forest in the creek bottoms, with their undergrowth of laurel and rhododendron, interspersed with small pools of stagnant water, were far more prolific in bird life than the hills and uplands above, although of so limited extent in comparison. Black-throated Blue, Black-and-yellow, Blackburnian, and Blue Yellow-backed, Warblers were the characteristic birds of such cool and shady recesses, within which they

were abundant, but outside of which they were not found at all. Several other species were more or less common also in such situations.

The high hills in which Chestnut Ridge terminates are clothed from base to summit with a deciduous forest, of which oaks of several species and chestnuts are the most prominent trees. The latter seemed to be more abundant near and on the summit than lower down. Black-throated Green Warblers were numerous throughout this woodland, where about the only other birds found to any extent were the Red-eyed Vireo, Golden-crowned Thrush, Black-and-white Warbler, Wood Thrush, and White-breasted Nuthatch, but none of these were nearly so common as the species which were confined to the hemlocks. At some points, where the original forest had been cut and second-growth and tracts of bushes and scrub had taken its place, the Chestnut-sided Warbler, Yellow-breasted Chat, Brown Thrasher, and Catbird were found, as well as a single individual of the Cerulean Warbler, which species was otherwise observed only in the open woods of the uplands outside of Chestnut Ridge. The cultivated districts were found almost altogether in these uplands, the birds of whose orchards, fields, and woods did not differ materially from those found in like situations in Beaver County.

In considering the faunal relations of the locality, we find that three species occur which are usually considered to belong to the Canadian Fauna, namely, *Dendroica cærulescens*, *Dendroica maculosa*, and *Dendroica blackburniæ*. It is a noteworthy fact that all these birds, which are abundant here in suitable situations, are rather uncommon in the Buffalo Creek region, while on the other hand two of the common relatively northern species of this latter locality—*Sylvania canadensis* and *Turdus fuscescens* — are here apparently altogether wanting.

Five species were found whose breeding range to the southward is limited to the Alleghanian Fauna: *Empidonax minimus*, *Helminthophila chrysoptera*, *Dendroica pensylvanica*, *Dendroica virens*, and *Parus atricapillus*.

Ten species were observed whose breeding range to the northward is likewise limited to the Alleghanian Fauna: *Colinus virginianus*, *Antrostomus vociferus*, *Sturnella magna*, *Icterus galbula*, *Ammodramus savannarum passerinus*, *Pipilo erythrophthalmus*, *Piranga erythromelas*, *Galeoscoptes carolinensis*, *Harporhynchus rufus*, and *Turdus mustelinus*.

The six following more or less typical Carolinian species were found: *Empidonax acadicus*, *Cardinalis cardinalis*, *Dendroica cærulea*, *Seiurus motacilla*, *Icteria virens*, and *Parus bicolor*.

It is to be remarked that the three species constituting the Canadian element are not the most typical of that fauna,[1] and furthermore that they are wholly confined to the deep hemlock woodland of the creek bottoms, the coolness of whose forest shade seems to become the equivalent of a higher altitude, as another writer has recently remarked.

It is, moreover, to be observed that only a few typical Carolinian forms occur, while the Alleghanian element is the most prominent as to number of species. On the whole, consideration of the above facts seems to bear out the conclusion that this region belongs to the Alleghanian Fauna, with, on the one hand, a slight tinge of lower Canadian forms where local conditions are favorable for their existence, and on the other a very considerable Carolinian element. Compared with the Buffalo Creek region it seems to be somewhat more southerly (in a faunal sense), since the relatively northern birds are more local in their distribution and are fewer, in number of species, though represented by a greater number of individuals.

But one paper containing any information on the birds of Chestnut Ridge has so far been published (that by Mr. C. H. Townsend in the Proceedings of the Philadelphia Academy of Natural Sciences for 1883, pages 59 to 68), and this information is so meagre as to be practically valueless for comparison. Of the birds of the country between Chestnut Ridge and the main Alleghany Mountains, including Laurel Hill, we know nothing as yet.

Sixty-five species were observed during my stay, of which the following is a list.

Actitis macularia. — Common at certain favorable points along Two Lick Creek, but observed also about marshy spots in the upland.

Colinus virginianus.—Quite abundant in the upland meadows and grain fields.

Bonasa umbellus —Met with but once, in the laurel and rhododendron thicket of Yellow Creek bottom.

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[1] *Cf.* Allen, in Stone, Proc. Phila. Acad. Nat. Sci., 1891, 433, foot-note.

Meleagris gallopavo. — On the last day of my stay a Wild Turkey hen, accompanied by three young less than a week old, appeared near the house where I was staying. It is quite possible that there were more young, but these were all that could be found. They were captured and taken into the barn, with the object of decoying the parent inside and capturing her also. She refused to enter, however, but presently flew to the roof, and afterwards lingered about for some time, and doubtless was in the vicinity when I arrived upon the scene, but I was prevented from making a careful search by lack of time. I was informed that Wild Turkeys were tolerably common in this county, and did considerable damage in the grain fields; on several occasions nests with eggs are said to have been found.

Zenaidura macroura.—Common everywhere, except in the deep woods.

Accipiter velox. — One observed near the summit of Chestnut Ridge.

Buteo borealis. — A pair seen circling over the summit of Chestnut Ridge.

Coccyzus americanus. — Observed but twice.

Ceryle alcyon. — Found along Yellow Creek on one occasion. From the lack of banks suitable for nesting purposes I should judge that it was not numerous.

Dryobates pubescens.—Found in the forest.

Melanerpes erythrocephalus. — One individual noticed in the upland, between Two Lick and Homer City.

Antrostomus vociferus. — Several were heard.

Chætura pelagica — Seen but once.

Trochilus colubris. — An individual observed along Two Lick Creek, at the village.

Tyrannus tyrannus. — Common. Found in orchards and at some points along the streams.

Myiarchus crinitus. — Not common.

Sayornis phœbe. — Common.

Contopus virens. — Common in the deciduous forest.

Empidonax acadicus. — This species was fairly abundant throughout the forests of the creek bottoms and was often found higher up along the courses of smaller streams.

Empidonax minimus. — A single pair was observed in the trees surrounding the house where I was staying.

Cyanocitta cristata. — A few observed.

Corvus americanus. — Abundant.

Molothrus ater. — A small party was noticed in an upland pasture between Two Lick and Homer City.

Agelaius phœniceus. — Found commonly in and about the upland meadows and streams.

Sturnella magna.— Not uncommon in the upland.

Icterus galbula. — Two or three were found in orchards about houses.

Quiscalus quiscula æneus. — Found in the same situations as the last species, but more common.

Spinus tristis. — Numerous everywhere, except in the forest.

Poocætes gramineus.— Common in the pastures and along the roadsides.

Ammodramus savannarum passerinus. — One pair was met with, frequenting a pasture field across the road from the house.

Spizella socialis. — Common and familiar as usual.

Spizella pusilla.—Numerous in waste pastures and in the bushy growth along fences.

Melospiza fasciata.—Abundant; found in its usual haunts.

Pipilo erythrophthalmus.—Common in briery thickets and on the edges of the woods.

Cardinalis cardinalis. — Several pairs were found, all in second-growth bushy thickets, both in the creek bottoms and on the hillsides.

Habia ludoviciana. — The Rose-breasted Grosbeak is one of the most abundant birds of this region. It does not affect the oak woods of Chestnut Ridge, nor yet the densér parts of the hemlock forest, but prefers the rich woods that border this last, as well as the upland woods near streams, and the tracts of second-growth interspersed.

Passerina cyanea.— This bird was found commonly in its usual haunts of bushy, briery thickets along the edges of the woods.

Piranga erythromelas.— Another very abundant species, especially partial to the hemlocks.

Petrochelidon lunifrons.— Observed about farm buildings, but not so numerous as the next species.

Chelidon erythrogaster.— Abundant about farm buildings.

Vireo olivaceus. — Very abundant throughout the woodland, in the bottoms and on the hilltops.

Vireo gilvus.—One pair was noticed in an orchard surrounding a farmhouse.

Mniotilta varia.—This species was one of the very few that were uniformly common in the hemlocks, in the second-growth, and in the oak forest of Chestnut Ridge.

Helminthophila chrysoptera.—But one observed,—on the edge of a wood on the bank of Two Lick Creek.

Compsothlypis americana.—Very common in the hemlocks, where its humming note could be heard continually. It usually kept high up in the very tops of the trees.

Dendroica æstiva.— Found mostly in the orchards about farmhouses; but two nests, one containing young, were discovered in a growth of willows fringing Two Lick Creek just behind the village.

Dendroica cærulescens.—This Warbler was confined to the hemlock forest of the creek bottoms, where it was abundant and in full song, haunting the dense laurel and rhododendron thicket beneath, though sometimes mounting to the trees.

Dendroica maculosa.— Equally abundant with the last species, and like it confined to the hemlocks and undergrowth below, where its sprightly song was constantly heard.

Dendroica cærulea.— Much to my surprise I found the Cerulean Warbler quite common, and musical, in the dry, open, oak woods of the uplands, though the only specimen secured was taken in a tract of dense second-growth on a creek hillside.

Dendroica pensylvanica.— Only two individuals noted, both males in full song, observed in a scrubby patch of briers, bushes and young trees, fringing a forest, on a creek hillside. I have reason to believe that this species was more common than it appeared to be.

Dendroica blackburniæ.— Another of the relatively northern species found exclusively in the conifers of the creek bottoms, where its flaming breast flashed in and out of the hemlocks. Not quite so numerous, however, as *D. cærulescens* and *D. maculosa*.

Dendroica virens.— This bird would be expected to occur most commonly in the hemlock forest, and though it actually was found on the edges of this to some extent, I was not a little surprised to discover that it was more numerous throughout the high oak and chestnut woods that cover Chestnut Ridge from base to summit, always keeping high in the treetops.

Seiurus aurocapillus.— A very common species, found throughout al kinds of woodland.

Seiurus motacilla.— A single pair recorded as frequenting a small stream flowing through the laurel and rhododendron growth in the hemlock forest of Yellow Creek bottom.

Geothlypis trichas.— Quite common, at intervals, in the waste ground along the banks of Two Lick Creek.

Icteria virens.— A few pairs of this distinctly southern species were noticed in the thickets to which it is always so partial.

Galeoscoptes carolinensis.— Common in briery thickets.

Harporhynchus rufus.— One pair accompanied by their young were seen in a thicket.

Sitta carolinensis.— Rather common throughout the woodland.

Parus bicolor.— A pair observed on one occasion in a yard around a dwelling.

Parus atricapillus.— Two noticed with the pair of Tufted Titmice above mentioned, and later on a pair accompanied by their now almost fully-fledged young.

Turdus mustelinus.— Common throughout the woodland.

Merula migratoria.— Abundant as usual.

Sialia sialis.— Several observed in an upland pasture on one occasion.

Clearfield County lies to the northeast of Indiana County, which it borders on the west to some extent. As a whole its elevation is greater, everywhere being above 1500 feet, and over a considerable area more than 2000 feet, this latter region including the Alleghany Mountains on the extreme southeastern part of the County and the somewhat less elevated portion lying immedi-

ately to the west, and extending for some distance into Indiana County. My notes were all made in the vicinity of Coalport, a mining town near the southern border of the county. This point was chosen because of its intermediate position with reference to Cresson on the one hand, whose summer birds Mr. Dwight has studied,[1] and DuBois, in the extreme northwestern part of Clearfield County, on the other hand, of whose breeding birds the Department of Agriculture possesses a very full and interesting manuscript list, compiled by Dr. Walter Van Fleet. This list includes nearly all the relatively northern species given by Mr. Dwight, as well as several others which he did not find, and, taken in connection with the present paper, goes to prove the correctness of Mr. Dwight's surmise that "much of northern and western Pennsylvania is at an altitude which, when combined with forest, cannot fail to attract birds of the Canadian avifauna." The influence of the character of the forest upon the distribution of birds was illustrated at Coalport where the extension of coniferous forest to the uplands was accompanied by a corresponding increase in the number and abundance of northern birds. These woods, composed almost wholly of *Pinus strobus* and *Tsuga canadensis*, were found on the hilltops and in the bottoms. *Pinus rigida* was not observed. The red-berried elder (*Sambucus pubens*) was another abundant and characteristic plant there, forming thickets at favorable points.

The country surrounding Coalport, like most of western Pennsylvania, is of a broken, hilly nature, intersected by numerous small streams. My collecting was mostly done in a tract of upland woods lying on both sides of one of these streams, where the slope was not steep. It was second-growth for the larger part, and in places quite bushy, though the numerous cattle-paths which penetrated it in all directions rendered progress through it quite easy. This proved to be a favorite place for Blue Yellow-backed, Black-throated Blue, Black-and-yellow, Blackburnian, Black-throated Green, and Canadian, Warblers, all conspicuously musical. Here, too, Hermit Thrushes were most numerous, and Snowbirds were frequently met with, as well as the only Winter Wren noticed. Several pairs of Chestnut-sided Warblers were found here also, but they were not half so common as the other Warblers mentioned.

[1] Auk, IX, 1892, 129–141.

On June 30, after exploring a swampy rhododendron thicket where I found northern Warblers numerous, among them several pairs of Water-thrushes, I came to one of the few tracts of original forest that are left in this neighborhood. I found it to be a thick wood of white pine and hemlock, with no undergrowth to speak of excepting along a small stream flowing through its midst. Scattered here and there were enormous trees of both these kinds, three and four feet through at the base, and rearing their lofty heads far above the general level of the treetops. Here is the haunt of the Blackburnian and Black-throated Blue Warblers, whose songs are heard on every hand, while from high overhead come the slender filing notes of the Black-throated Green Warbler and the cicada-like humming of the Blue Yellow-backed. Snowbirds, too, were occasionally seen, and Wood Thrushes.

Only fifty-five species were recorded during my stay at Coalport, which was from June 28 to July 2, 1892. That this is less than half the actual number breeding is evident by a comparison with Mr. Dwight's list for Cresson and Dr. Van Fleet's for DuBois. Eight species, all except two very common, were found whose affinities are with the Canadian Fauna, as follows: *Junco hyemalis*, *Dendroica cærulescens*, *Dendroica maculosa*, *Dendroica blackburniæ*, *Seiurus noveboracensis*, *Sylvania canadensis*, *Troglodytes hiemalis*, and *Turdus aonalaschkæ pallasii*.

Four in their southern breeding limit characterize the Alleghanian zone: *Empidonax minimus*, *Dendroica pensylvanica*, *Dendroica virens*, and *Parus atricapillus*.

Eight in their northern breeding limit likewise characterize the Alleghanian zone: *Antrostomus voctferus*, *Sturnella magna*, *Icterus galbula*, *Pipilo erythrophthalmus*, *Piranga erythromelas*, *Galeoscoptes carolinensis*, *Harporhynchus rufus*, and *Turdus mustelinus*.

These facts seem to justify the conclusion that the district is Alleghanian in its fauna, with a very decided Canadian element however, which latter is probably greater than was apparent from my limited observations.

The following is a complete list of the birds observed during my stay.

Bonasa umbellus. — Only one individual seen; found in the second-growth.

Zenaidura macroura. — Common in the open, especially near houses.

Accipiter velox. — One, which from its actions doubtless had young near by, was seen on the edge of a dense coniferous forest.

Accipiter cooperi. — A single pair, also evidently with young, were the only ones observed.

Dryobates villosus. — Several seen in the timber.

Dryobates pubescens. — Not uncommon in the woodland.

Melanerpes erythrocephalus. — But one bird noted.

Colaptes auratus. — Numerous everywhere except in the deep woods.

Antrostomus vociferus. — Numbers heard every night.

Chordeiles virginianus. — A few observed on one occasion.

Chætura pelagica. — Quite common.

Trochilus colubris. — Seen but once.

Tyrannus tyrannus. — A pair had a nest in one of the trees near the house where I was staying.

Myiarchus crinitus. — Not common; one pair was observed, whose nest was in the top of a tall forest tree.

Sayornis phœbe. — A single individual was met with near a house on the outskirts of the town.

Contopus virens. — Rather common, numbers being seen daily, mostly on the edge of the woods.

Empidonax minimus. — One pair observed in the trees near the house, in one of which they must have had a nest.

Cyanocitta cristata. — Frequently noticed in the woodland, and sometimes about houses.

Corvus americanus. — A very common species almost everywhere.

Sturnella magna. — Quite common in the open fields, where it was found daily.

Icterus galbula. — This species, although not actually observed by me, is yet entitled to a place on the list from the fact that I was shown, for identification, an example of its nest which had been taken a few years before and preserved as a great and rare curiosity for this part of the country.

Spinus tristis. — Seen on only one occasion, — though perhaps more common than was apparent.

Poocætes gramineus. — Found commonly in its usual haunts.

Spizella socialis. — Abundant throughout the open.

Junco hyemalis. — This species I found at intervals throughout the forest, and in some places it was fairly abundant. Its favorite haunts were the edges of woods, tracts of scrub, and rich second-growth woods, though some were detected in the depths of the original hemlock and pine forest, where they were usually found hopping about on the ground. In other situations it was the rule to find the males perched in the very tops of some tall tree which had been left standing, singing for hours at a time. Although so common, various circumstances unfortunately conspired to

prevent my preserving more than one specimen — a female. This was submitted to Mr. Ridgway to learn if it bore any relationship to *carolinensis*, and he has very kindly compared it and in a note to me states as follows: "Your Junco from Coalport, Pa., is *very* close to *J. h. carolinensis*. In fact, is quite typical of that race as to color of plumage and bill, but bill is too slender. Possibly a larger series of female *carolinensis* would show specimens with bill equally as slender, but we have only the two specimens." It would of course be out of the question to conclude that the Snowbirds of this section all belong to this subspecies on the evidence of a single specimen, especially in view of Mr. Dwight's recent researches on the subject. I regard the bird secured as being merely an extreme case.

Melospiza fasciata. — Abundant in suitable situations everywhere.

Pipilo erythrophthalmus. — A few found in the second-growth.

Habia ludoviciana. — Abundant everywhere except in the original forest.

Passerina cyanea.—Of frequent occurrence; found mostly along the roadsides.

Piranga erythromelas.—Abundant in the woodland, especially so in the hemlocks.

Chelidon erythrogaster.—This species, the only Swallow found, was very abundant about farmhouses.

Ampelis cedrorum.—Numerous; seen every day in the trees about the house.

Vireo olivaceus.—Common, most so in the second-growth.

Mniotilta varia.—This species seemed to share in the general abundance of Warblers which is so characteristic a feature of the avifauna of this locality, being much more numerous than in any other section I have visited heretofore. It frequented the second-growth for the most part.

Compsothlypis americana.—Found in the original forest as well as in the second-growth, and in both these situations abundant, but usually keeping high up.

Dendroica æstiva.—Met with only about houses, and apparently not common.

Dendroica cærulescens.—Abundant throughout both the second-growth and the original forest.

Dendroica maculosa.—Very abundant in the same situations as the last species, but as a rule keeping lower down in the bushes and undergrowth.

Dendroica pensylvanica.—Numerous in the second-growth, but not nearly as abundant as several other Warblers, in spite of the apparent suitability of the place to its needs.

Dendroica blackburniæ.—Another very abundant species, met with both in the second-growth and in the original forest.

Dendroica virens.—Abundant throughout the woodland in all situations.

Seiurus aurocapillus.—Abundant everywhere in the woods.

Seiurus noveboracensis.—Several pairs were met with in a swampy rhododendron thicket in a semi-wooded bottom, along a small stream.

Geothlypis trichas.—Rather common about the thicket where the last species was noticed, and seen also elsewhere. One individual was observed whose song was peculiar, an extra syllable being added, whose timbre most resembled that of the Kentucky Warbler's chirp.

Sylvania canadensis.—Not observed in the depths of the original forest, though perhaps found there to some extent; abundant in the thickets and in the second-growth, especially about damp places, where its sprightly song was constantly to be heard.

Galeoscoptes carolinensis.—Abundant in the second-growth as well as about dwellings.

Harporhynchus rufus.—A few observed.

Troglodytes ædon.—Four pairs in all were noted, which is a larger number than I have ever before met with in an equal extent of territory. All were found near dwellings, except one which haunted a deserted saw-mill on the edge of a wood.

Troglodytes hiemalis.—One pair only met with, in the denser second-growth, where I listened to its enchanting song, and on the last day of my stay succeeded in securing it.

Sitta carolinensis.—Of infrequent occurrence.

Parus atricapillus.—A pair observed constantly near the house, in the immediate vicinity of which they no doubt had a nest.

Turdus mustelinus.—Common throughout the woodland.

Turdus aonalaschkæ pallasii.—Fully as numerous as the last species; but, unlike it, found mostly in the more open woods and the second-growth.

Merula migratoria.—Found commonly about houses.

Sialia sialis.—A few observed by the roadside on one occasion.

DESCRIPTION OF A NEW JUNCO FROM CALIFORNIA.

BY LEVERETT M. LOOMIS.

Junco pinosus, new species. POINT PINOS JUNCO.

SP. CHAR. — Most nearly like *J. h. thurberi*, but throat, jugulum, and fore breast slate-gray, varying to dark slate-gray, and upper portions of head and neck slate-gray, varying to blackish slate; bill averaging broader and longer.

♂ *ad.* (No. 278, museum of Leland Stanford Junior University, vicinity of Monterey, Cala., July 4, 1892; Leverett M. Loomis). Upper part of head and neck blackish slate, changing, on sides of head and neck, to slate-gray on throat, jugulum, and fore breast; this dark color being abruptly defined against the colors of the body; interscapulars and scapulars pale chestnut; rump gray, tinged with chestnut; posterior part of breast, abdomen, and lower tail-coverts white; sides faintly washed with vinaceous-buff; two outer rectrices wholly white, the third partially white, the others dark brown; wings dark brown, more or less edged with chestnut and whitish.

This type specimen is in rather worn plumage. Of three other males (all taken during the first two weeks of July) one is almost an exact counterpart of the specimen described, the other two represent a darker and lighter phase in the shade of the slate-gray of the fore-neck and breast and in the blackish slate and dark slate-gray of the upper part of the head and neck.

♀ *ad.* (No. 281, museum of Leland Stanford Junior University, vicinity of Monterey, Cala., July 4, 1892; Leverett M. Loomis). Similar to the male, though smaller, with color of anterior parts grayer, especially the throat and sides of head. The chestnut of the back is deeper than in any of the males. This is also true in the only other female I preserved. Except on the throat the second female is darker anteriorly than the palest male; the dimensions of the male, however, are considerably greater.

♂, ♀ *hornoi.* (Description based upon two males and two females taken during the first fortnight of July). Above pale chestnut, more or less slightly tinged with slaty on crown, narrowly streaked with blackish, the streaks predominating on top of head; below white, tinged in a varying degree with buffish, and streaked, except medially, with dusky, thickly on breast and jugulum and more or less sparsely on throat and sides; sides of head with colors and markings of upper and lower parts variously blended; wings blackish, broadly edged on inner secondaries and greater coverts with pale chestnut; middle coverts less broadly edged and with greater coverts tipped with buffish, forming two inconspicuous bars; primaries edged with whitish, shading into the chestnut of secondaries; inner rectrices blackish, margined with pale chestnut; outer one wholly white, second chiefly white, third with or without a white spot.

DIMENSIONS OF ADULTS (in millimetres).

No	Sex	Length	Wing	Tail	Chord exp. culmen	Width upper mandible at base	Tarsus	Remarks
277	♂	152.40	73.15	68.58	11.68	5.84	19.56	
278	♂	147.32	71.63	63.50	10.92	5.84	20.32	Type
279	♂	144.78	70.36	66.04	10.67	5.84	20.32	
280	♂	152.40	72.39	67.31	10.92	5.84	20.32	
281	♀	144.78	67.31	66.04	10.67	5.84	18.54	Type
282	♀	147.32	68.58	63.50	10.67	5.33	19.56	

This Junco is distinguished at a glance from *thurberi*, which it appears to approach nearest, by the decided slate-gray aspect of the fore breast, jugulum, and throat. The palest female *thurberi* I have seen is distinctly darker than the darkest male *pinosus* of the series. The average greater length and breadth of the bill is also a prominent character when the two birds are compared The color of the bill and the color of the eyes were not noted in the field, which is to be regretted, as additional characters might have been afforded by their determination.

I have described this new Junco provisionally as a distinct species, because the material within my reach has not shown that it intergrades with *thurberi* or any other form. The name chosen, *pinosus*, is from Point Pinos, the place of discovery, which forms the south side of the entrance of Monterey Bay. I first met with it in a pine grove on the reservation of the Point Pinos Lighthouse, June 21. 1892, my first collecting day in the locality. Subsequently I found it was a common bird, frequenting the more open places in the pine woods which largely cover the high, cold promontory of Monterey.

The fact that a Junco should be found breeding at the sea level so far south in California is very significant and in itself is enough to suggest the existence at least of a local race. It will be interesting to learn the status of the birds breeding in the Coast Range, particularly those of Santa Clara County.

Since the above was penned I have submitted the specimens described to Mr. Ridgway and he writes me: "I have examined them carefully, and have not the slightest difficulty in recognizing the marked differences presented by your birds from a series of *J. h. thurberi*. There can be no question as to their distinctness."

ADDITIONS TO THE LIST OF MANITOBAN BIRDS.

BY ERNEST E. THOMPSON.

Since the publication of my notes on "The Birds of Manitoba,"[1] I have been able to make a number of additions to our list of Provincial birds. These are chiefly the results of my own trip to the Province in 1892, but important assistance has been received from others and is duly acknowledged in place.

Ardea egretta. AMERICAN EGRET. — A fine specimen of this bird was shot on Duck Bay, Lake Winnipegoosis, in 1886, by Mr. David Arm.t. Through the courtesy of this gentleman, and also of Mr. Wm. Clarke, the Chief Factor at Winnipeg, who sends me the bird, I am enabled to examine and report fully. It is an adult in full plumage. Length, 40½ inches; beak, 4½; wing, 15½; tarsus, 6½. This is, I believe, the northernmost record for the species.

Grus canadensis. LITTLE BROWN CRANE. — A specimen of this bird was mounted in Toronto by Mr. Thurston who stated that it was killed on the Qu'Appelle River. This may or may not bring the species within our limits but it certainly would at least inscribe it on our probable list, for I am informed by Mr. Ripon of Toronto that this bird commonly breeds on the upper Qu'Appelle. This specimen I have seen, and measured as follows: wing 19 inches; tarsus, 6; toe, 3½; beak, 3⅝.

Micropalama himantopus. STILT SANDPIPER. — On August 29, at Carberry, I made the first positive capture of this species in the Province. It was in a mixed flock of Sandpipers of several species.

Zenaidura macroura. MOURNING DOVE. — The disappearance of the Passenger Pigeon has been closely followed by the appearance of the Common Dove. In the three years of my residence in the Province early in the eighties, I saw but one Dove; now, however, they abound on the Big Plain wherever there are trees and water. Three or four pairs seem to be semi-domesticated about each barnyard that affords the above requisites, and they appear to be spreading farther each year, and greatly increasing in numbers.

Archibuteo ferrugineus. RED ROUGHLEG. — A fine specimen of this was taken near Winnipeg by Mr. Hine, and is now in the Manitoba Museum. It had previously been listed as probable only.

Falco rusticolus obsoletus. BLACK GYRFALCON. — This species also I had listed as probably Manitoban in winter. Since then two fine specimens have been taken and are now in the Manitoba Museum.

Tyrannus verticalis. ARKANSAS KINGBIRD — Two specimens of this, an adult and one in first plumage, were taken by Mr. D. Losh Thorpe at the Souris coal fields, August 20, 1891. This is not many miles to the west of the Province and justifies the insertion of the species as probably Man-

[1] Proc. U. S. Nat. Mus., XIII, 1891, pp. 457–643.

itoban. My thanks are due to Mr. Thorpe for the privilege of examining this and other specimens in his collection.

Myiarchus crinitus. CRESTED FLYCATCHER. 'TYRANT FLYCATCHER.' — Three specimens of this, to us, scarce bird, are in the Manitoba Museum; all were taken near Winnipeg. While at Carberry I several times met with it; and it is to be considered much less rare than I formerly supposed.

Leucosticte tephrocotis. GRAY-CROWNED FINCH. 'PINK SNOWBIRD.'— I have in my collection an adult of this species taken near Birtle, Manitoba, in January, 1891, by Mr. George Copeland. Also in the Manitoba Museum are two specimens taken in the Province by Mr. Hine. These give a considerable eastward extension to the range of the species.

Rhynchophanes mccowni. MCCOWN'S LONGSPUR. — A specimen of this bird taken by Mr. Thorpe near Dalesbro, just west of our borders, justifies its inclusion as a probable straggler.

Ammodramus caudacutus nelsoni. SHARP-TAILED SPARROW. — On my arrival at Winnipeg Mr. Hine surprised me by producing a specimen of the above, shot at Winnipeg on May 25, 1892. On June 30, at Carberry, while out in pursuit of Leconte's Sparrow, I heard a curious note, unlike that of the species I was after. On going over the slough to the spot I put up two small, dark-colored Sparrows. I got one with the right, but the left barrel missed fire. The new species was also *caudacutus*, and I several times heard its notes afterwards in this and other similar regions about. On September 1, while out Duck-shooting in a new locality, I came on a large straggling flock of Sparrows in a slough; for the sake of identification I shot one, and again found it *caudacutus*. The same day at a point four miles west, I met with another flock, and again secured a true Sharptail. These two birds, though much injured by the duck shot, are now in my collection. They have been submitted to Mr. F. M. Chapman, who pronounces all to be of the subspecies *nelsoni*.

Stelgidopteryx serripennis. SAW-WINGED SWALLOW. — A specimen of this bird, taken near Winnipeg by Mr. Hine, is in the Manitoba Museum.

Anthus spraguei. MISSOURI SKYLARK.—This bird was very abundant on the Big Plain in 1882, but in 1892 I failed to see or hear a single individual in the country. They appear to have totally disappeared. This is unquestionably owing to the breaking up of the virgin prairie. The progress of agriculture has apparently affected this more than any other species, but has also wrought marked changes in the distribution of several. The Pinnated Grouse, as well as the Sharp-tailed Grouse, the Dove, the Shore Lark, the Meadowlark, and the Vesper Sparrow have all increased remarkably within the last ten years. The same may be said of all the Blackbirds excepting the Cowbird. The Passenger Pigeon, Swainson's Hawk and several of the Ducks have suffered, but the Missouri Skylark alone seems to have found itself quite unable to cope with the surroundings of the new order of things.

Sialia sialis. BLUEBIRD.— It is gratifying to note that this species, instead of very rare, has become quite common in the country along the Assiniboine; and nearly every grove of oak of any extent is found to have a pair making their home in it along with the Purple Martins.

ON THE GENUS *PITTA* VIEILLOT.

BY D. G. ELLIOT.

IN 1816 Vieillot instituted in his 'Analyse d'une nouvelle Ornithologie élémentaire,' p. 42, the genus *Pitta* for those birds designated Brève by Buffon. *Pitta* was defined as follows:

"BRÈVE, *Pitta*. *Corvus*, Linn. Gm. Lath.
Bec robuste, un peu épais à la base, droit, convexe en dessus, comprimé, pointu; mandibule supérieure échancrée vers le bout; l'inférieure entière, égale.—Ailes longues.—Queue courte.
Esp. Brève, Buff."

Beside the character "*Queue courte*," he gives no other which might not equally apply to the species in the other division of the family which are at present included in the genus *Eucichla*. "*Queue courte*" is a relative term, as all the species of Pitta have short tails in comparison to their size, although some have them longer than others, and even all the members of *Eucichla*, the so-called long-tailed species, are not equal in this respect, *E. ellioti* and *E. gurneyi* having rectrices intermediate in length between the very short-tailed species, of which *P. brachyura* (Linn.) may be considered the type, and *E. guaiana* (Müll.), which represents those with long tails, and is the type of its genus.

Vieillot cites the Brèves of Buffon as those birds he intended should be included in his genus. These are four in number, *three* only of which, not *all* as stated by Sclater (Ibis, 1877, p. 260), belong to the short-tailed group, and one to the long-tailed. They are the *Merle des Philippines*, pl. 89 (*P. sordida* Müll.), *Merle des Moluques*, pl. 257 (*P. moluccensis* Müll.), *Merle vert des Moluques*, pl. 258 (*P. coronata* Müll.), and *Merle de la Guiane*, pl. 355 (*P. guaiana* Müll.).

Pitta Vieillot is therefore a composite genus, and an author when dividing the family into different genera has a perfect right to choose as the type for his division *Pitta* any of the species among those included by Vieillot in his genus, when he had made them all equal, and recognized no generic differences among them, and placed both short- and long-tailed species in one genus.

In my 'Monograph,' published in 1863, I restricted the term *Pitta* to those birds with the long, pointed tails, and adopted for the short- nearly square-tailed species the term *Brachyurus*, Thunberg (Vet. Akad. Handl. 1821, p. 370). This, however, has been twice previously employed in zoölogy, first by Latreille in 1802 for a genus of crustacea, and again in 1814 by Fischer for one of mammals, and cannot, therefore, according to the principles adopted by naturalists at the present day, be again employed in ornithology. In 1859 Reichenbach in his 'Systema Avium,' pl. lii, separated the fourth species in Vieillot's genus, *le Merle de la Guiane*, from the rest, and made it the type of a new genus *Eucichla*, thus leaving the short-tailed birds to represent Vieillot's genus *Pitta*, of which the type, if we take the first species mentioned by Buffon, would be that on plate 89, the *Merle des Philippines* (*P. sordida* Müll.), and not *P. brachyura* as given by Sclater (Cat. Bds. Brit. Mus., XIV, 1888, p. 413), which is not mentioned at all by Buffon in his work, the *Merle de Bengale*, as figured on Plate 258, being a Moluccan and not an Indian species.

If, therefore, the Pittidæ are to be divided into three genera, we should have *Anthocincla* with *A. phayrei* as its type, *Pitta*, with *P. sordida* for its type, comprising all the birds with very short, slightly rounded rectrices, and *Eucichla* with *P. guaiana* as type, including the species with rather elongated, pointed tails. Not sufficient is known at present of the anatomy of *Coracopitta* to warrant its reception into Pittidæ, the probability being that it belongs to a different family.

THE NESTING OF THE BLACK DUCK ON PLUM ISLAND.

BY CHARLES SLOVER ALLEN.

(*Plates I and II.*)

ALTHOUGH having an area of but a few hundred acres, Plum Island is so varied in its topography and so rich in bird life that it proves a most interesting little world of its own. The narrow eastern portion consists of high, rocky, upland pastures, without a tree or bush. In the miniature valleys each tiny pond has its pair of noisy Killdeers whose nearest neighbors are the Plovers on the hillside and the Nighthawks breeding on the rocky ledges. The whole north shore forms a long, irregular sand cliff of considerable height, thickly studded with huge glacial boulders; some stranded on the beach were thirty feet high, while others showed great rocky masses far out in the water. Prior to 1885, when 'Old Jerome' still owned the island and his law of absolute protection was in full force, there were but few of these boulders that were not crowned with Fish Hawks' nests, to which the Kingfishers paid their visits, like the minstrels of old to the castles of the Vikings. The Swallows had located their colonies in the lesser sand banks of the southern shore that gradually became a broad beach with low scattered sand hills to the westward where the island broadened out into a great rolling sandy plain. Terns were breeding in the drift and sedge close to the beach at South Point. As everywhere else upon this island, Fish Hawks were nesting here by the hundred, on the few isolated and dwarfed trees, and on the ground wherever there was a little sand hill or by the side of each convenient stump, stake, or piece of stranded timber. Sandpipers, Meadowlarks, Sparrows and the like were fearlessly nesting within a few yards of them. Even in the densely populated strip of fairly heavy timber, some eight or ten acres in extent, the Fish Hawks were on the very best of terms with all their smaller neighbors, save only the Crows that represented the criminal element of this community, and a large rookery of Night Herons that persisted in occupying that swampy corner of the woods that merged into and were in part surrounded by the great fresh water marsh in the centre of the island. In this marsh it was that I finally found my

Black Ducks (*Anas obscura*) breeding among the numerous small islands and open places of clear water.

During my first visits to Plum Island in 1879 and 1881 Mr. Jerome and the lighthouse keeper made frequent mention of the fact that a pair of Wood Ducks and several pairs of Black Ducks had been frequently seen, both in this swamp and in a salt water marsh nearer the beach during the spring and summer for several years. In spite of diligent search I merely caught a hurried glimpse of them once or twice and utterly failed to locate their proper address. May 25, 1885, while wading through this swamp in search of Rails, I crossed a narrow bushy little island. I was startled by a peeping sound and a scramble under my feet and a glimpse of a moving line of brown and yellow balls, a dozen or more in number, that instantly vanished. I spotted the hiding place of the last unfortunate duckling and finally captured it after an exciting chase. I caught a glimpse of the parent bird just vanishing behind an island of grass near by, but in spite of over an hour's dilligent and minute search where every leaf was turned, I utterly failed in seeing another of the young and in flushing the old bird, though the young ones were calling all around me. Nor could I find that particular nest during my stay, although I found two others, with eggs just hatching, on the 27th. The first I discovered by fairly stepping upon the old bird while on the nest, which was so boldly located that I never thought of searching anywhere near it. The marsh lay directly in line and midway between Jerome's house and the tilled land, orchards, and sheep barn a mile away, on which a Fish Hawk had its nest. As it was a long way around, a causeway had been built through the centre of this swamp, as a short cut, some thirty years before. From some historic event it was called Love Lane. After the trees had grown up along its sides, each had its bulky Fish Hawk's nest, with numerous families of Grackles as subtenants and boarders. At the further end of this causeway, where all was open and the pasture began, there was a small isolated clump of myrtle five feet in diameter, extending from the wheel track to the water's edge. Twice a day the farm hands, with oxen and wagons, stumbled through one edge of this patch and the wheels broke down the twigs, while the Black Duck was on the nest but three or four feet away. I had brushed through it many times when on my way to search the hidden recesses of the swamp.

Early in the morning, May 27, I saw a Rail dodge into this little clump from the water's edge, and in trying to find it I stepped into the Duck's nest, flushing the bird and partly breaking one of the eleven eggs it contained. They were uncovered, though embedded in down, and several were already pipped. The old bird soon came back to the marsh and suddenly appeared in the clear water from behind some bushes and tried to entice me away. After cutting away some of the branches concealing the nest I started back along the causeway so as to bring my camera from the lighthouse. I had gone but a hundred yards or so when another Black Duck appeared swimming in a clear patch of water far out in the centre of the marsh. It vanished behind a grassy ridge and then took wing. Although I had no boots I waded out and examined a tuft of bushes and grass far back in the direction from which the Duck was swimming. This bird had undoubtedly been startled by the outcries of the first, and had quietly left her nest, only showing herself when at a distance. In this nest, fairly covered with down, were four young already hatched and not dry as yet, and six eggs rapidly hatching in the hot sun. When I returned to this nest with the camera an hour later, every egg had hatched and nothing but the empty shells remained. I could find nowhere the slightest trace of the birds, young or old.

I was very careful in approaching the first nest and stood watching the actions of the bird while she was preparing to leave the nest. For nearly a minute she seemed busy with the eggs and the down under her, as though partially covering them up. Then she silently slipped into the water, diving just behind a tuft of grass. The water was so shallow and clear that I could plainly watch her as she swam under water close along the edge of the causeway, instead of going out into the wild canals of the marsh. She came to the surface with a wild outcry some distance beyond me and close to the path. I dropped everything and followed, while she kept fluttering in apparently the most helpless manner, and even struggling as though drowning, but a few feet away. She seemed to realize that I would not follow her out into the deep water of the marsh, so she still kept along the edge of the causeway, gradually increasing her distance from me and recovering from her crippled state, until she finally swam behind a bushy island and from there took flight off toward the ocean.

I found the eggs pretty well covered when I went to the nest. In order to let the bird come back I spent over an hour taking notes in the woods the other side of the marsh and in searching for the Wood Duck's nest. On returning I purposely came upon the Black Duck suddenly, in order again to flush her as I had done when finding the nest. The eggs were uncovered to a great extent, one bird was entirely out of the shell and drying, so that the fluffs of down were beginning to break their casings and clothe the little one. Several others were nearly out of their shells, and most of the eggs were already cracked in a circle near one end. While I was photographing the nest and young, the old bird returned, flying high, but after circling lower, alighted in the water a hundred feet away with a sudden loud outcry. When she failed to entice me away, she approached much nearer, and finally crawled out upon the causeway within twenty-five feet, and dragged herself back and forth through the rank grass and down the narrow path as though both wings, and legs as well, were broken. Her mate I never saw, but during the hour that I sat watching the rapid hatching out of the eggs in the hot sun this poor, distressed bird was untiring in her efforts to lure me away, and often approached so near that I could have caught her by a sudden rush before she could have cleared herself from the tall grass.

The plate (Plate I) is a poor one, but it shows the nest, with eggs embedded in the down, and if one looks closely the partly hatched young can be seen.

The exact method adopted by the bird in freeing itself from the shell proved interesting. I will describe the procedure as it occurred in an egg that I took from the nest before the first crack had appeared. While examining it there was evidence of a strong muscular effort on the part of the bird inside, and a small disk of shell was chipped out and raised above the surface at about one third of the distance from the end; then came a second or two of rest, followed by what felt like a scramble inside; then a second of quiet and the horny little knob on the end of the bill was driven through the shell one eighth of an inch to the right of the first puncture. This routine was repeated over and over until some twenty-five or thirty punctures had been made, completely encircling one end of the egg, each being about one eighth of an inch to the right of the preceding one. The efforts seemed

stronger as it started around the same circle again, and the cap of the shell would be lifted a little each time, showing that it was attached by little more than the tough membrane beneath the shell. Before the second circle was half completed, it tore the cap loose so that it could be raised like the lid of a box, with one inch of the membrane acting as a hinge. In freeing itself from the shell the neck was stretched out and the little one breathed for the first time. Then the shoulders were pushed out into my hand, free of the shell, one wing after the other being freed, while the bird lay gasping and gaping widely with its bill. In half a minute more it was entirely free from the shell and lay weak and helpless in the sun, its wet, slimy skin absolutely bare, save here and there small dark hairs widely separated. As it began to dry it gained in strength and made feeble efforts to stand, resting on the whole length of the tarsus. In drying the hairs no longer adhered to the skin. Soon each little pointed hair began to crack and split open, and from this protective casing there came a light fluff of down nearly as large as the end of one's finger. It was more surprising than the bursting of a grain of pop corn, though far less rapid. It took comparatively few of these yellow and brown fluffs to convert the naked weakling into a beautiful downy duckling that stood up boldly in my hand and began to notice what was going on about it, especially the calls of the parent bird close by. Each went through the same procedure, invariably breaking the shell from left to right. They showed no fear and would cuddle under one's hand very confidingly.

When I visited the nest late in the afternoon, after they had had a few hours of instruction from the careful mother, they deserted the nest in wild alarm the moment I appeared in sight, and instantly concealed themselves so as to baffle all search, though all were in plain sight an instant before. This nest was close to that of a Fish Hawk of which it showed no fear whatever, though I saw one Black Duck that was flying over the marsh suddenly double up and apparently fall over and over, striking the water as if it had been shot and making an instant dive, as a Red-tailed Hawk came sailing over the treetops.

During the three days I remained on the island I never succeeded in seeing one of these thirty odd ducklings though I more than once heard the old bird calling out warnings to the brood near her.

Three of the eggs that were uncracked were placed in the cool water to delay hatching and carried back to the lighthouse after I had finished watching the other eggs hatch. One egg hatched on the way and I found the bird dead in my pocket, a rather disgusting object, wet and naked, while the others were alive and nearly free from the shells. In the sun they soon became covered with down like the others, but the dead one refused to blossom out under the same conditions. Drying it with alcohol and rubbing with a soft brush caused these hair-like pointed casings to split and come away in segments, giving as perfect plumage as any. My two pets refused to eat and when I tried to feed them with milk gruel and egg from a glass dropper they fought against the procedure with all their puny might so piteously that I was forced to give it up and carry them back to the nest where I left them with the old bird near at hand. Next day I found them there, one dead and the other dying. I was forced to be content with them as specimens. Since then I have carefully watched the hatching of many different kinds of birds, both domestic and wild, and have found their different methods intensely interesting. In all cases nature provides practically the same hair-like cylinders as a water-proof protection to prevent the down from getting wet and matted by the slimy liquids within the egg. In some the process of drying, with the bursting of these sheaths and blossoming out of the bulky down tufts, is very rapid indeed, while others require many hours. Unless thus protected the down of all birds would become a very sorry matted mass before they left the shell, and infinitely more uncomfortable to the bird as this albuminous mass dried and hardened upon the delicate skin. It could never become the same light, fluffy, protective covering to the young bird.

It is an interesting study to note just where and how each different bird cuts through the shell in gaining its liberty, whether around the centre of the egg, or near the base or point, and whether by successive punctures toward the right or left, or more or less irregularly. Each seems to have, within certain limits, the head and armed beak approximately in the same relative position as others of its kind, and it escapes in much the same way. A Heron's egg is broken at a very different place and in a very different manner from that of a Duck, a Quail, or a Snipe. The shape of the egg has likewise much to do with it. I should like

to hear next fall from such as are willing to study the shells left in and about deserted nests, and to watch the process wherever they have the opportunity; also the time required for the down to burst forth from the enclosing sheath or envelope. I have known this to cause a difference of opinion as to whether the young of a certain bird were dark slate-color or pure white, when it was only a matter of the difference of some hours or days in their age. The skin and cylindrical hairs were dark in this case, but the down was white. Each was looking at the other side of the traditional shield.

[Plate II represents the Black Duck Group in the American Museum of Natural History, New York City. The nest, young birds, and accompanying accessories were collected by Mr. Jenness Richardson, on Gardener's Island, New York, May 9, 1889, by whom also the group was mounted at the Museum. This group is No. 46 of the Museum series of bird groups prepared by Mr. Richardson. — ED.]

FIFTH SUPPLEMENT TO THE AMERICAN ORNITHOLOGISTS' UNION CHECK-LIST OF NORTH AMERICAN BIRDS.

BY ORDER of the Council of the American Ornithologists' Union the Committee on Classification and Nomenclature of North American Birds has prepared the following report on the species, subspecies, and changes of nomenclature proposed during the year ending November, 1892, forming the Fifth Supplement to the American Ornithologists' Union Check-List. The Committee met in Washington, Nov. 18–19, 1892, with the following members present: Allen, Chapman, Coues, Merriam, and Ridgway.

The numbers at the left of the scientific names facilitate collation with the Check-List. The interpolated species and subspecies are numbered in accordance with the provision made

therefor in the Code of Nomenclature. (See page 14, last paragraph.)

Committee { Elliott Coues, *Chairman.*
J. A. Allen.
William Brewster.
Frank M. Chapman.
Charles B. Cory.
D. G. Elliot.
H. W. Henshaw.
C. Hart Merriam.
Robert Ridgway.

I. ADDITIONS.

310 *c.* **Meleagris gallopavo ellioti** Sennett.

Rio Grande Turkey.

Meleagris gallopavo ellioti Sennett, Auk, IX, April, 1892, 167, pl. iii.

[B 458, *part*, C 379, *part*, R 470, *part*, C 553, *part.*]

Hab. Lowlands of southern Texas and eastern Mexico.

360 *a.* **Falco sparverius deserticolus** Mearns.

Desert Sparrow Hawk.

Falco sparverius deserticolus Mearns, Auk, IX, July, 1892, 263.

[B 13, *part*, C 346, *part*, R 420, *part*, C 508, *part.*]

Hab. Southwestern United States, north to northern California and western Montana, south to Mazatlan in northwestern Mexico.

360 *b.* **Falco sparverius peninsularis** Mearns.

St. Lucas Sparrow Hawk.

Falco sparverius peninsularis Mearns, Auk, IX, July, 1892, 267.

[B 13, *part*, C 346, *part*, R 420, *part*, C 508, *part.*]

Hab. Lower California.

454 *a.* **Myiarchus cinerascens nuttingi** (Ridgw.).

Nutting's Flycatcher.

[B 131, *part*, C 248, *part*, R 313, *part*, C 375, *part.*]

Myiarchus nuttingi RIDGW., Proc. U. S. Nat. Mus. V, 1882, 394.

Myiarchus cinerascens nuttingi ALLEN, Bull. Am. Mus. Nat. Hist. IV, Dec. 1892, 346.

HAB. Southern Arizona, southward through western Mexico to Costa Rica. (*Cf.* FISHER, Auk, IX, Oct. 1892, 394.)

Added to the Hypothetical List.

11.1. **Numenius arquatus** (LINN.).

European Curlew.

Scolopax arquata LINN. Syst. Nat. I, 1758, 145.

Numenius arquatus LATH. Gen. Syn. Suppl. I, 1787, 291.

[B—, C—, R—, C—.]

Recorded as occurring on Long Island, N. Y. (*Cf.* MARSHALL and DUTCHER, Auk, IX, Oct. 1892, 390–392.) While there is no question as to the proper identification of the specimen, the evidence that it was taken on Long Island is not considered as entirely satisfactory.

II. CHANGES OF NOMENCLATURE.

It having been decided to recognize *Ardetta* GRAY as a full genus, instead of as a subgenus of *Botaurus*, Nos. 191 and 191.1 will stand as follows:—

191. **Ardetta exilis** (GMEL.).

191.1. **Ardetta neoxena** CORY.

216 *a*. **Porzana jamaicensis coturniculus** BAIRD. This becomes

216.1. **Porzana coturniculus** (BAIRD). (*Cf.* RIDGWAY, Proc. U. S. Nat. Mus. XIII, 1890, 309.)

391. **Ceryle cabanisi** (TSCHUDI). This becomes Ceryle americana septentrionalis SHARPE. (*Cf.* SHARPE, Cat. Birds Brit. Mus. XVII, 1892, 134.)

425. **Micropus melanoleucus** (BAIRD). This becomes

Aëronautes melanoleucus (BAIRD).

(*Cf.* HARTERT, Cat. Birds Brit. Mus. XVI, 1892, 459. *Aëronautes* HARTERT, gen. nov.; type, *Cypselus melanoleucus* BAIRD.)

It was decided to recognize *Calypte* GOULD, *Selasphorus* SWAINSON, *Stellula* GOULD, and *Calothorax* GRAY, as full genera instead of as merely subgenera of *Trochilus* LINN. This decision disposes of the question of *Trochilus floresii* GOULD (1861, *nec Trochilus floresii* BOURCIER, 1846) *vs. Trochilus rubromitratus* RIDGWAY. (*Cf.* RIDGWAY, Auk, VIII, Jan. 1891, 114.) The species of Hummingbirds numbered 430 to 437, inclusive, will hence stand as follows:—

430. **Calypte costæ** (BOURC.).
431. **Calypte anna** (LESS.).
431.1. **Selasphorus floresii** (GOULD).
432. **Selasphorus platycercus** (SWAINS.).
433. **Selasphorus rufus** (GMEL.).
434. **Selasphorus alleni** HENSH.
436.[1] **Stellula calliope** (GOULD).
437. **Calothorax lucifer** (SWAINS.).

III. FORMS CONSIDERED AS NOT ENTITLED TO RECOGNITION.

Vireo vicinior californicus STEPHENS, Auk, VII, April 1890, 159. Not admitted on account of the insufficiency of characters alleged.

IV. PROPOSED CHANGES OF NOMENCLATURE REJECTED.

Columbigallina purpurea MAYNARD (Am. Exch. and Mart., III, 1887, 33) *vs. Columbigallina passerina* (LINN.). (*Cf.* BERLEPSCH, Journ. f. Orn. 1892, 97.) Rejected on the ground that the hypothetical case upon which the name *purpurea* was tentatively proposed proves to be without foundation.

[1] No. 435, *Trochilus heloisa*, has been eliminated. (*Cf.* Auk, VIII, Jan. 1891, 88.)

Geococcyx mexicanus (GMEL.) *vs. Geococcyx californianus* (LESS.). (*Cf.* SHELLY, Cat. Birds Brit. Mus. XIX, 1891, 419.) Rejected on the ground that if *Phasianus mexicanus* GMEL. be identifiable at all it must relate to *Geococcyx affinis* HARTL. rather than to the more northern *G. californianus*.

V. ACTION DEFERRED FROM LACK OF MATERIAL.

Final action on the following was deferred, owing to the absence of necessary material.

Megascops asio aikeni BREWST., Auk, VIII, April, 1891, 139.

Megascops asio macfarlanei BREWST., Auk, VIII, April, 1891, 140.

Megascops asio saturatus BREWST., Auk, VIII, April, 1891, 141.

The availability of *Conuropsis* SALVAD. vs. *Conurus* KUHL (Cat. Birds Brit. Mus., XX, 1891, 203) was referred to a subcommittee to report thereon to the Committee of 1893.

In reference to the generic value of *Anstrostomus* (*Cf.* HARTERT, Ibis, April, 1892, 285), it was voted, in view of the insufficiency of the material available for examination, that for the present no change be made in respect to its status in the Check-List.

ERRATUM.— In the Fourth Supplement to the Check-List number 567*e* (Auk, IX, Jan. 1892, 107) should be 567*d*.

TENTH CONGRESS OF THE AMERICAN ORNITHOLOGISTS' UNION.

THE TENTH CONGRESS of the American Ornithologists' Union was held in the Lecture Hall of the United States National Museum, Washington, D. C., Nov. 15–17, 1892. There were present during the session twenty Active Members and twenty-four Associate Members. The report of the Secretary gave the

status of membership as follows: Active Members, 45; Honorary Members, 22; Corresponding Members, 74; Associate Members, 416. Total, 557, showing an increase of 64 for the year. During the year the Union lost by death Dr. John Amory Jeffries, an original Active Member, who died in Boston, Mass., March 26, 1892; Dr. Hermann Burmeister, an Honorary Member, who died in Buenos Ayres, May 1, 1892, in his 86th year; and Capt. Thomas Wright Blakiston, an original Corresponding Member, who died in San Diego, California, Oct. 15, 1891, aged 59 years. The report of the Treasurer showed the finances of the Union to be in excellent condition.

The following officers were elected for the ensuing year, Mr. D. G. Elliot declining to be a candidate for reëlection as President: Elliott Coues, President; William Brewster and Henry W. Henshaw, Vice-Presidents; John H. Sage, Secretary; William Dutcher, Treasurer. Three Active Members were elected, as follows: Frederic A. Lucas, Witmer Stone and Leverett M. Loomis. Sixty-seven Members were added to the Associate list.

The usual reports of Committees were received, and the proposed amendment to Article V, Section 4, of the By-Laws was adopted. In order to gain more time for the reading of papers, it was voted that in future a session shall be held during the evening of the day on which the stated meeting of the Council is held, for the election of officers and members and the transaction of the usual routine business of the Congress, which heretofore has occupied the greater part of the first day's session. As the stated meeting of the Council is held on the day preceding the meeting of the Union, this change adds one day to the time available for the reading of papers, practically without extending the length of the Congress.

A resolution was also adopted that on the decease of any Active Member of the Union, the President shall appoint a committee of one to prepare a suitable memorial of the life and work of the deceased member, to be read at the first stated meeting of the Union, and to be published in 'The Auk' as an expression of the sense of the Union.

The following papers were presented:

1. Birds of Lewis and Clarke in 1892. Elliott Coues.

2. Summer Birds of Indiana and Clearfield Counties, Pa. W. E. Clyde Todd.

3. The Geographical Distribution of the Genus *Megascops* in North America. E. M. Hasbrouck.

4. Summer Birds of Prince Edward Island. Jonathan Dwight, Jr.

5. A Partial List of the Birds of White Head Island, Maine. Arthur H. Norton.

6. The Origin and Geographical Distribution of North American Birds. J. A. Allen.

7. The Life Areas of North America, considered especially in Relation to their Classification and Nomenclature. J. A. Allen.

8. The Flycatchers of the *Myiarchus mexicanus* and *M. cinerascens* Groups. J. A. Allen.

9. Notes on Birds observed in Cuba. Frank M. Chapman.

10. Remarks on the Origin of West Indian Bird Life. Frank M. Chapman.

11. A Review of the Faunal Literature of North American Ornithology. Frank M. Chapman.

12. Some Eccentricities in Geographical Distribution. D. G. Elliot.

13. Observations on the Knot (*Tringa canutus*). George H. Mackay.

14. Migration of *Charadrius dominicus* in Massachusetts in 1892. George H. Mackay.

15. The Autumnal Plumage of the Hooded Warbler. Wm. Palmer.

16. Food Habits of the Common Crow. Walter B. Barrows.

17. A Preliminary Investigation of the Food Habits of *Ampelis cedrorum*. F. E. L. Beal.

18. Notes on *Helminthophila chrysoptera*, *pinus*, *leucobronchialis* and *lawrencei* in Connecticut. Jno. H. Sage.

19. Additions to the List of Manitoban Birds. Ernest E. Thompson.

20. Feeding and Breeding Habits of the Manitoban Icteridæ. Ernest E. Thompson.

21. Feeding Habits of the Pinewood Woodpeckers. Ernest E. Thompson.

22. The Distribution of the Genus *Harporhynchus*. T. S. Palmer.

23. Exhibition of specimens of the Imperial Woodpecker. T. S. Palmer.

Resolutions were adopted tendering the thanks of the Union to the Regents of the Smithsonian Institution for the use of the Lecture Hall of the National Museum as a place of meeting for the Tenth Congress of the Union, and for other courtesies, and to the Washington members for their cordial welcome and generous hospitality to the visiting members.

It was voted to hold the next Congress of the Union in Cambridge, Mass., on the third Tuesday of November, 1893.

RECENT LITERATURE.

The British Museum Catalogue of the Picariæ.—The "Order Picariæ," as treated in the 'Catalogue of the Birds in the British Museum' (Vols. XVI–XIX), consists of eight 'suborders,' as follows: (1) Upupæ, (2) Trochili, (3) Coraciæ, (4) Halcyones, (5) Bucerotes, (6) Trogones, (7) Scansores, (8) Coccyges. This arrangement is adopted tentatively, as under the head of 'Order IV, Picariæ' (p. 1) we find the following: "The adoption of an 'order of Picarians' is at best a provisional measure, and if this 'order' be thought to be inadmissible, then the divisions proposed by Mr. Seebohm would have to rank as separate orders, and might be arranged in a sequence more in conformity with what are, at present, considered their natural affinities."

The volumes treating of the Scansores and Coccyges appeared in 1890 and 1891, the Woodpeckers (Vol. XVIII) being by Mr. Hargitt (*cf.* Auk, VIII, Jan., 1891, p. 92), and the remaining families of the Scansores and the Coccyges (Vol. XIX) by Mr. Sclater and Mr. Shelley, respectively (*cf.* Auk, IX, Apr., 1892, p. 184). Volumes XVI and XVII have recently appeared, the former[1] embracing the Upupæ and Trochili, by Mr. Osbert Salvin, and four families of the Coraciæ, by Mr. Ernst Hartert; the latter[2] (Vol. XVII) contains the remaining families of the Coraciæ, the Halcyones, Bucerotes, and Trogones, by Mr. Sharpe and Mr. Grant.

The 'suborder Upupæ,' although comprising only about 15 species, is divisible into two families,—the Hoopoes (Upupidæ), with one genus and 5 species, and the Wood-Hoopoes (Irrisoridæ), with three genera and 10 species.

The 'suborder Trochili' includes 127 genera, as defined by Mr. Salvin, and 482 species, represented in the collection of the British Museum by 8253 specimens, of which 161 are type specimens of valid species. This large number of specimens includes "the two largest collections of Humming Birds that have been made hitherto, viz. those of the late Mr. J. Gould and of Messrs. Godman and Salvin." The group is arbitrarily

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[1] Catalogue | of the | Picariæ | in the | Collection | of the | British Museum. | — | Upupæ and Trochili, | by | Osbert Salvin. | Coraciæ, | of the Families | Cypselidæ, Caprimulgidæ, Podargidæ, and | Steatornithidæ, | by | Ernst Hartert. | London: Printed by order of the Trustees. Sold by | Longmans & Co., 37 Soho Square; | . . . . [= etc., 4 lines] 1892.—8vo. pp. xvi + 704, pll. xvi.=Catalogue of the Birds in the British Museum, Vol. XVI.

[2] Catalogue | of the | Picariæ | in the | Collection | of the | British Museum. | — | Coraciæ (contin.) and Halcyones, | with the Families | Leptosomidæ, Coraciidæ, Meropidæ, | Alcedinidæ, Momotidæ, Todidæ, and Coliidæ, | by | R. Bowdler Sharpe. | Bucerotes and Trogones, | by | W. R. Ogilvie Grant. | London: Printed by order of the Trustees. | Sold by Longmans & Co., 39 Paternoster Row; | . . . . [= etc., 4 lines] 1892.—8vo, pp. xi, 522, pll. xvii. = Catalogue of the Birds in the British Museum, Vol. XVII.

divided into three 'sections,' according to the presence or absence, or partial absence, of serrations near the tip of the bill, viz. (1) 'Trochili serrirostres,' (2) 'Trochili intermedii,' and (3) 'Trochili lævirostres.' The difficulty of finding trenchant characters for the subdivision of the Trochili into natural supergeneric groups is well known, but the one here chosen seems the most unfortunate and artificial that could have been selected. Besides being one of degree merely of a character rarely strongly marked, the major divisions based on it separate widely genera which in general characters are often closely related. This results in extensive transpositions of genera from the order in which they have heretofore usually been placed. As already stated, the number of species recognized as valid is 482; as, however, a number of species are mentioned in foot-notes as unknown to the author, and thus not included in the above number, the total of species and subspecies may be estimated in round numbers as not far from 500. This is a considerable increase over the number (426) recognized by Mr. Elliot in 1878, since which time, however, many new species have been described. The method of treatment is of course similar to that of the preceding volumes of the 'Catalogue.' We note one new genus, *Neolesbia* (p. 145, type *Cyanolesbia nehrkorni* Berl.), but the eight apparently new species, as they stand in the body of the work, were really described in 1891, in the 'Annals and Magazine of Natural History' (Vol. VII. pp. 375–379), as duly noted in the 'Addenda' to the present volume.

The Trochili occupy pp. 27–433 of Vol. XVI, and are followed by the first four families of the 'Coraciæ,' namely, Cypselidæ, Caprimulgidæ, Steatornithidæ, and Podargidæ, by Mr. Hartert. The Cypselidæ number 78 species, and are represented in the British Museum by 1500 specimens; the Caprimulgidæ number 86 species, represented by 1800 specimens; the Podargidæ number 24 species, represented by 271 specimens; and the Steatornithidæ by 1 species and 14 specimens. Respecting the relationships of some of these groups, Mr. Hartert observes: "The Cypselidæ have been placed, along with the Trochilidæ and Caprimulgidæ, in the order 'Macrochires' or 'Strisores.' This arrangement is based on good grounds, and has much to commend it. Some recent anatomists deny the near relationship of these families. If raised to the rank of orders, Cypseli, Trochili, and Caprimulgi should be placed near together" (p. 435).

Mr. Hartert prefers to retain the name Cypselidæ for the Swifts, in place of Micropodidæ, on the ground that the law of priority should apply to families as well as to genera and species. With this we agree, but we differ from Mr. Hartert in his interpretation of its application to families. When *Cypselus* is shown to be a synonym of *Micropus*, and *Micropus* becomes the name of the group formerly currently known as *Cypselus*, from which the name of the family was derived, we believe the name of the family should be changed to conform to the correct name of the genus from which the name of the family is taken. In cases like the present it might seem better to retain well-known family names, although based on

generic names which have lapsed into synonymy. But suppose it had turned out that *Cypselus* was not merely a synonym of an earlier name for the same genus, but was preoccupied in some other department of zoölogy, or for a genus in some other family of birds. The propriety and even desirability of changing the family name derived from *Cypselus* would then be obvious. In fact, such change would be in accordance with current usage. Hence Canon V of the A. O. U. Code of Nomenclature, which rules that "When a generic name becomes a synonym, a current family or subfamily name based upon such generic name becomes untenable." We believe that a rule in nomenclature, if it is to have any value, must be a strict rule, and hence not open to exceptions, to be determined by the individual preferences of authors.

Mr. Hartert considers, and apparently with good reason, that our North American *Micropus melanoleucus* is not congeneric with the Old World species of *Micropus* (type, *Hirundo apus* L.), and has accordingly instituted (p. 459) for it the new genus *Aëronautes*. He also proposes the new genus *Claudia* (p. 469) for the South American *Cypselus squamata* Cass.

Mr. Hartert sees no reason for recognizing the genus *Antrostomus* Nuttall as distinct from *Caprimulgus* (*cf.* Ibis, April, 1892, p. 285). He therefore places all the species, from both North and South America, for a long time generally referred to *Antrostomus*, in the genus *Caprimulgus*, which, as thus defined, includes about 50 species and subspecies, and has a nearly cosmopolitan distribution.

The *Antrostomus macromystax* of Baird and Ridgway (*cf.* Ridgw., Man. N. Am. Bds., p. 298), is described as a new species, under the name *Caprimulgus salvini* (Ibis, 1892, p. 287), it being not the *Caprimulgus macromystax* Wagler, which Mr. Hartert makes identical with Brewster's *Antrostomus vociferus arizonæ*. Thus *C. macromystax* Wagler becomes *C. vociferus macromystax* (Wagl.) Hartert.

Phalænoptilus nuttalli nitidus Brewst. and *P. n. californicus* Ridgw. are not considered as separable, even as subspecies, from *P. nuttalli*. We are of opinion, however, that this conclusion is open to revision.

It is interesting to note that a specimen (♂ ad.) of *Otophanes macleodi* Brewst. is reported from the Salvin-Godman Collection, collected at Zapotlan, Jalisco, Mexico, by Mr. W. Lloyd, making the second specimen of this peculiar form thus far known to science.

The North American species of *Chordeiles* stand as in the A. O. U. Check-List, except that *C. texensis* is made a subspecies of *C. acutipennis* —the status formerly accorded it by American writers.

In Volume XVII, Mr. Sharpe treats the families Leptosomatidæ, Coraciidæ (Rollers), Meropodidæ (Bee-eaters), Alcedinidæ (Kingfishers), Momotidæ (Mot-mots), Todidæ (Todies), and Coliidæ (Colies), and Mr. Grant the Bucerotes (Hornbills) and Trogones (Trogons). These nine families include 397 species (exclusive of subspecies), represented in the collection of the British Museum by 7904 specimens. The Kingfishers number 183 species (besides 30 subspecies), the Hornbills 68, the Trogons 47, the Bee-eaters 36, the Rollers 25, leaving 37 species only to

the remaining three families. Of the 397 species treated in the volume "only 16 species are wanting to the collection of the Museum, and more than one fourth of them are represented by the types." Of the 23 species and subspecies described as new, or which are newly named, 18 are Kingfishers. Our North American *Ceryle cabanisi* is described as a new subspecies, under the name *Ceryle americana*, subspecies β. *septentrionalis*, trinomials, pure and simple, not being admitted into the 'Catalogue of the Birds in the British Museum.' True *cabanisi* is restricted to "Peru." The tropical American *Ceryle superciliosa* is separated into three subspecies, — the true *superciliosa* of South America, *stictoptera* Ridgw. from Mexico and Central America, and *æquatorialis* (subsp. nov.) from Ecuador. Throughout Mr. Sharpe's portions of the work not only have many new forms been described, but many old ones have been reduced to subspecies. Mr. Grant does not appear to recognize subspecies; even where forms are shown to intergrade, as in the *Trogon caligatus* group, they are either kept separate, or lumped as 'races,' distinguished by the letters A, B, etc., as under *Trogon atricollis*, where we have "Race A (*Trogon atricollis*)" and Race B (*Trogon tenellus*)."

These useful volumes, with those previously published, bring this great work through the Raptorial, Passerine, 'Scansorial' and Psittacine series, leaving for future volumes the Pigeons and Grouse, the Tinamous, and the Wading and Swimming Birds, which will probably require many additional volumes to the twenty already published.—J. A. A.

Cory's 'Catalogue of West Indian Birds.' — Mr. Cory's 'Catalogue'[1] is intended to be used in connection with his 'Birds of the West Indies,' the 'Appendix' including a number of species not in that work, as well as many changes in nomenclature. The 'Catalogue' consists essentially of five parts: (1) a tabular list of the genera and species peculiar to the West Indies (pp. 9–20); (2) a bibliography of West Indian ornithology, arranged (*a*) geographically by islands or groups of islands (pp. 21–60), and (*b*) chronologically (pp. 61–79); (3) the 'Catalogue' proper (pp. 81–125); (4) lists of the species and subspecies peculiar to the different islands (pp. 126–134); (5) 'Appendix' (pp. 135–157), consisting of annotations to the 'Catalogue' proper.

The main 'Catalogue' is briefly annotated with reference to the distribution of the species, but instead of giving the names of the islands in full only the group of islands is mentioned, the separate islands where the species occur being denoted by numerals, a key to which is given in the preface and at p. 80. While this saves space and possibly saved trouble to the author, it entails upon the reader the labor of constant reference to

[1] Catalogue | of | West Indian Birds. | Containing a list of all species known to occur in the Bahama Islands, the | Greater Antilles, the Caymans, and the Lesser Antilles, excepting | the Islands of Tobago and Trinidad, | by | Charles B. Cory,— . . . .[=8 lines of titles, etc.] | — | Published by the Author. | Boston, U. S, A. | 1892,— 4to, pp. 163 and map.

some other part of the book for an explanation of often a long series of numerals — a case of mistaken and vexatious economy. The Appendix contains much interesting matter in the way of geographical and technical notes. His *Zenaida richardsoni* (Auk, IV, 1887, p. 4) he now refers to *Z. zenaida* (p. 138). He adopts the name *Zenaida castanea* Wagl. for what has previously passed currently as *Z. martinicana*, on the ground of the latter name being untenable.

Mr. Cory recognizes four species of Sparrow Hawks from the West Indies, namely *Falco sparverius*, from the Bahamas, etc.; *F. dominicensis*, from San Domingo and Haiti, probably straggling occasionally to eastern Cuba; *F. sparverioides*, from Cuba, where it is represented by a light and dark phase; and *F. caribbæarum*, from Porto Rica and the Lesser Antilles. He thus differs from Mr. Ridgway's conclusion (Auk, 1891, p. 113) that *sparverioides* is a synonym of *dominicensis*.

The Burrowing Owls from the Bahamas he considers (p. 140) should all be referred to *Speotyto cunicularia floridana*, including his own *S. c. bahamensis*. *Lampornis ellioti* Cory is now referred to *L. virginalis* Gould. On the authority of Dr. L. Stejneger (ined. MS. letter, pp. 147, 148) the generic name *Loxigilla*, long in current use for *Fringilla noctis* Gm. and allies, is supplanted by *Pyrrhulagra* Bon., the type of *Loxigilla* being an Australian species to which and its congeners the name properly belongs. Mr. Cory characterizes as new subspecies *Pyrrhulagra noctis grenadensis* from Grenada and St. Vincent, and *P. n. ridgwayi* from Dominca and the Lesser Antilles situated to the northward of this island. Mr. Cory has also extended critical notes on *Vireo calidris* and its allies, on *V. crassirostris*, and on *Cœreba bartolemica*, etc.—J. A. A.

Dixon's 'The Migration of Birds.'[1] — Mr. Dixon is well known as a popular writer on British birds, among which he easily takes high rank. In his present work he has attempted a weighty task, which is no less than a serious attempt "to bring our present knowledge of migration within the limits of order, or to reduce it to law." His book, he tells us, "embodies the result of twelve years of diligent general study and research, and of at least two years' close application and thought, and will, I earnestly hope, serve at least the humble purpose of paving the way towards a more important record." "The whole subject of migration is so vast, so wide reaching, and so complicated, that it would be absurd to regard it as exhausted, and the present volume must be looked upon only as a pioneer."

Mr. Dixon has succeeded in bringing together, in a very readable and suggestive way, an extensive array of general facts bearing upon the

[1] The Migration of Birds | an Attempt | to Reduce Avian Season-Flight to Law | By Charles Dixon | author of 'Rural Bird-Life,' 'Evolution without Natural Selection,' .... [= 5 lines of additional titles of books, and motto of 3 lines.] London: Chapman and Hall, Ld. | 1892. — 8vo., pp. xvi+300.

subject in hand, mixed with many assumptions which the general reader would hardly be able to distinguish from the really sound data. Here and there, however, are lapses that betray the amateur rather than the scientific investigator, as where at page 69 he speaks of young birds as being "in the normal course of things the first to be in position to migrate; they travel in their first plumage, and consequently are ready to go as soon as they can fly." While this may be true of a few water birds, it is notoriously untrue of the Passeres and the great majority of land birds. Again (p. 66) Swallows and Shrikes are mentioned as birds "in which the plumage is renewed in early spring," in contrast with others in which the "change is undergone in autumn." We fear Mr. Dixon's field experience, at least as a collector, has been limited, evidence of which is unfortunately not lacking in various parts of the work.

The book consists of twelve chapters, having the following headings: 'Ancient and Modern Views of Migration'; 'Glacial Epochs and Warm Polar Climates'; 'The Philosophy of Migration'; 'Routes of Migration'; 'Emigration and Evolution'; 'Internal Migrations and Local Movements'; 'Nomadic Migration'; 'The Perils of Migration'; 'The Destinations of the Migrants'; 'The Spring Migration of Birds'; 'The Autumn Migration of Birds'; 'Migration in the British Islands.' These titles serve to give a general idea of the character of the book.

In the first chapter some fifteen pages are devoted to a discussion of the theory of hibernation, the author reciting the well-worn evidence and familiar arguments in its favor, the former dating from the seventeenth century onward; he adduces nothing new on the subject. "Hibernation," he says, "so far as we can learn, only applies to a few individuals, and no species of bird has yet been discovered in which the practice is universal, if we except conditionally the [American] Swift (*C. pelagica*), to which allusion has already been made. As for myself, I neither accept nor deny it, having personally seen nothing to refute or confirm it, although fully believing it possible," etc.

Mr. Dixon generalizes with great freedom respecting all of the more prominent features of the general subject of migration, often thereby disclosing an ignorance of the facts in the case naturally to be expected in one who has a ready explanation for nearly every problem. Thus at page 24, after instancing the various degrees of migration exhibited in different species, he says: "From the above facts, we may propound the law that wherever the breeding area of a species intergrades with its winter range, migration among individuals breeding in the infringing districts has been suffered to lapse." In this country the contrary is well known; while this 'infringing district' may be permanently occupied by the species, it is evident that it is not occupied the whole year by the same birds; the summer representatives moving more or less to the southward in winter and their places being taken at that season by birds of the same species which have passed the breeding season further north.

Respecting the cause of migration we have the following: "Birds migrate from necessity, not from choice; . . . . I do not know of any

instance where some or all of the individuals of a species quit their breeding-grounds unless compelled to do so by severity of climate, failure of food, or both" (p. 24). "Amongst birds in which the habit of migration is dominant, the impulse to migration is unquestionably instinctive, in the sense of being transmitted from parent to offspring, which has become so deeply rooted in the uninterrupted course of countless ages of passage to and fro, that in many species nothing but death can eradicate it. . . . This desire to migrate gradually becomes an overwhelming desire, before which all other inclinations bow, and at last the great flight is commenced. But here instinct, hereditary desire, ceases its sway; reason, memory, knowledge of locality and perception take its place" (p. 26). Again he says (p. 70): "It must not be supposed, however, that because the impulse to migrate is inherited from their parents, the *ability* to do so is equally hereditary. That has to be acquired; the road has to be pointed out by the more experienced guiding birds, and the long, often circuitous, route has to be *learnt* by the experience of not one but many annual journeys to and fro."

How this is brought about, Mr. Dixon proceeds to explain. The pioneers, the "*avant-courières* of the migrating army," he tells us, are the barren or unmated birds which have no home ties, or else those that have lost their eggs or young broods, and are thus free from any restraining influence due to parental instinct, in which "the desire to migrate often becomes so prematurely strong that they begin to leave their summer quarters in some cases even before their moult is absolutely completed." The young birds of the year are next to follow, as, since "they travel in their first plumage," "they are the first to be in position to migrate," and "consequently are ready to go as soon as they can fly." (!) "A week or so after the young birds have left, the adult males begin their migration, having got over the moult a little earlier than the females, the latter being delayed somewhat by maternal duties, so that their departure is a little later still. The rear of the great migrating army" is brought up by the halt and the lame, or by birds delayed "from various causes," either in starting or on the way. In the spring migration the order of return is somewhat reversed, the adult males going first, followed soon by the females, later by the young of the previous year, and last of all by "the weakly and the wounded." "Unquestionably the one grand dominating impulse of migration in spring is reproduction" (p. 202).

We have thus the complete history of the migratory movement, including its causes, manner of inception, and the methods of its execution, down to even minute details. Unfortunately, however, many of his statements are purely assumptions, impossible of verification, and often improbable, though given with the positiveness of observed facts; and he fails to note their occasional lack of harmony, amounting in some instances to complete contradiction.

He states that "we can only make the wildest guesses at the time occupied by individual birds in reaching their summer or winter quarters. . . . . Probably migrating birds do not average more than 300 miles per

day, during their journey north or south." A little attention to the report on 'Mississippi Valley Bird Migration,' by Professor Cooke (which, by the way, there is nothing in the book to show that our author ever heard of) would have shown that we are not left to the "wildest guesses" on this subject, or that anything like an average journey of "300 miles per day" is ordinarily made by birds while on migration. The Dotterel (*Eudromias morinellus*), which "breeds on the tundras of Arctic Euro-Asia, and winters in Africa, north of the Equator," he supposes to make the "enormous flight of quite 2000 miles" between these two points, "without a rest, and between sunset and sunrise,"—or, to put the case more definitely, by flying at the rate of 200 miles an hour from 7 P.M. of one day till 5 A.M. of the next—an average rate of three and one-third miles per minute for ten consecutive hours! "Each migratory bird," he says, "must have a wonderful knowledge of the topography of its own particular routes, aided by its marvellous power of memory and keenness of sight. I would suggest, however, that the migration flight reaches its highest altitude when passing over seas. These offer no landmarks, no bearings, nothing that maa serve as a guide; consequently the line of flight rises to a sufficient altitude to enable the bird to bridge the passage with its keen powers of vision." Besides: "The mere mechanical labour of flight is rendered much easier of performance in the more rarefied atmosphere of these lofty regions of space."

Although the author so modestly characterizes his book "as only a pioneer" in this interesting field, where previously was merely a "chaos" of "raw and tangled data," the reading of the two chapters entitled 'The Philosophy of Migration,' and 'Routes of Migration,' to say nothing of the one on 'Glacial Epochs and Warm Polar Climates,' begets the feeling that if all Mr. Dixon says is to be taken as sound "Philosophy" and knowledge "reduced to Law," little is left for future investigators to settle among all the many hitherto troublesome problems relating to the migration of birds. However extensive Mr. Dixon's researches may have been into the literature of the subject, he rarely gives his readers any clue to the sources of his information, or any opportunity for verification of alleged facts. There is, in fact, hardly a direct citation of any work or paper on the subject, excepting a few references to some of the author's former works, and a few references given in the chapter in which the subject of hibernation is treated. Many of his assumptions and theories, however, are not new.

For the most part the author's treatment of the subject is more or less oracular. His agreeable style and considerable power of imagination, aided by a fair conception of the general subject, despite a rather loose grasp of the underlying facts, will doubtless render his book an attractive one to the general reader, and a profitable venture for both author and publisher. The book, though at many points untrustworthy, is suggestive, and it may be read with interest and profit by even those who may not approve of all of the author's generalizations. — J. A. A.

Torrey's 'The Foot-Path Way.'[1] — Mr. Torrey's writings always have a charm in their happily worded sentences that never dull the delicate edge of his humor, and that bring us the fragrance of the northern woods without loss of any of its freshness, but each time he gathers together a new volume we realize more and more the weightier reasons for his preëminence in the group of writers with whom one naturally associates him. He is not merely a philosopher and a sayer of happy things. He observes nature keenly as well as sympathetically, and with a spirit of scientific caution that stamps his work with a value which the writings of many a more prominent ornithologist will never possess.

About two thirds of the chapters in the present collection are devoted to birds, and in them he tells much that is interesting besides some facts of real importance—as for instance the record of the Pine Grosbeak as a summer bird on Mt. Lafayette, New Hampshire. Two chapters are given to his experience of the breeding habits of *Trochilus colubris;* there is another upon 'Robin Roosts'; and such titles as 'June in Franconia,' 'The Passing of the Birds,' 'A Great Blue Heron,' and 'December Out-of-doors,' give a fair idea of the other ornithological contents of the volume. Most of the chapters have already appeared in the pages of the 'Atlantic Monthly,' but their reappearance in the present form deserves a cordial welcome. — C. F. B.

Ornithological Report of the Canadian Institute.[2]—This publication is a record of the members' observations reported at the meetings from April 15, 1890, to June 9, 1891. It contains among other things a detailed report, of fourteen pages, from a number of observers, on the occurrence of the Evening Grosbeak in Ontario during the winter of 1889–90, and an annotated list, by W. L. Kells, of nearly a hundred and fifty species occurring at Listowel, Ontario. In addition to these there are a multitude of brief notes, some of the highest interest, others less important, relating many of them to habits, but the majority to dates of migration, etc., of various species, rare and common. With hardly an exception the localities referred to are all within the Province of Ontario. It is impossible here to quote any, even the most interesting, of the records, in spite of the importance of many of them, especially of such as bear upon the faunal peculiarities of the region.

The number of persons who have contributed to the report is large, and their work seems, on the whole, to show unusual accuracy as well as

[1] The Foot-Path Way | by | Bradford Torrey | [five lines=quotation] | [vignette] | Boston and New York | Houghton, Mifflin and Company | The Riverside Press, Cambridge | 1892 — 16°, pp. [iv,] 245.

[2] Proceedings | of the | Ornithological Sub-section | of the Biological Section of the | Canadian Institute | for | 1890–91 | edited by the editing committee. | (Extracted from the Proceedings of the Canadian Institute by permission | of the Council.) | — | Price--25 cents. | — | Toronto: | The Copp, Clark Company, Limited, | 9 Front Street West. | — | Published Nov. 1892. — Proc. Canad. Inst., Vol. III, pp. 27–89.

activity in the field. If they can continue to accumulate data at the present rate, we may soon hope to know more of the birds of the Province than of almost any other part of Canada.

The only serious fault to be found is with the arrangement of the matter, which seems to have been printed in the order in which the observations happened to be reported at the successive meetings. There is a vast mass of valuable material, but much of it is, for this reason, almost inaccessible. This difficulty might have been to a great extent remedied by a good index, which is sadly lacking.—C. F. B.

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GENERAL NOTES.

Larus argentatus smithsonianus.—In a letter dated Sept. 28, 1892, from Captain Edward Fogarty of the Brenton Reef Lightship he writes: "Our old friend 'Gull Dick' [Auk, IX, 227] has again appeared for the twenty-first season, being a little earlier than last year. The bird looked as if it had suffered somewhat from the effects of the recent northwest gale, for it is minus two feathers from one wing and one from the other, otherwise the same old Dick. The bird arrived at five o'clock on the afternoon of September 28, 1892. On receiving its supper it appeared quite hungry, devouring five pieces of pork each the size of a hen's egg. There have been a few other Gulls around the past three or four days, but they are all gray ones."

On the morning of August 28, 1892, at Nantucket, Mass., I saw two white and two gray Herring Gulls, four in all. They probably came on the heavy northeaster (wind blowing at the rate of 37 miles an hour) on the afternoon and night of the 26th.—GEORGE H. MACKAY, *Nantucket, Mass.*

Branta canadensis.—At Prince Edward Island on September 6, 7, and 8, 1892, Canada Geese gathered at Hogg Island flats, at the mouth of Richmond Bay, to a greater extent than has ever been known before at this season of the year, estimates of the number being impossible. On September 9 they rose up in the air, and remained in sight some thirty minutes. As watched from a distance of about two miles they had the appearance of a large thunder cloud over a mile in length. Mr. William Everett of Dorchester, Mass., who visits Prince Edward Island every season has kindly furnished me with the above information.

Mr. H. G. Nutter of Boston informs me that he saw at Ponkapog Pond, Mass., Oct. 17, 1892, four flocks of Canada Geese flying southwest. One flock contained seven birds; one, eleven; one, thirty-two; and the other, forty to fifty.—GEORGE H. MACKAY, *Nantucket, Mass.*

Branta bernicla at Nantucket, Massachusetts.—I am informed by Mr. Charles E. Snow that on Nov. 22, 1892, while shooting at the extreme western end of Nantucket, he saw large numbers of Brant (*Branta bernicla*) flying towards the southwest. They passed mostly through the 'opening' between the islands of Nantucket and Tuckernuck. Some of the flocks contained from one to two hundred birds. He also noted several hundred American Eider Ducks (*Somateria dresseri*) well up in the air flying in the same direction. The wind was north-northwest and northwest.—GEORGE H. MACKAY, *Nantucket, Mass.*

Notes on the American Bittern.—Late last September a female *Botaurus lentiginosus* was discovered by some boys upon the margin of a small pond at a short distance behind my residence. It was a most unusual locality for the species to occur, and its coming there appeared to have been due to the fact that the bird was exhausted by long flight. After flying a few yards it was easily captured, and was brought to me alive, without having received any bodily harm whatever. Next morning it had recovered no little of its strength, and it was remarkable to observe how noiselessly and with what ease it could fly about a furnished room without overturning any small object of furniture. It gracefully flew up from the floor and perched upon the curtain rod of a high window, where it sat for an hour or more in a characteristic position, as motionless as a statue. If approached when upon the ground, it eyed you keenly, assumed a squatting posture, widely spread out the feathers at either side of the neck, while it slightly raised those of the rest of the body and its wings; and finally, when it considered you within the proper distance, drew all its plumage close to its body and delivered, as quick as a flash, a darting blow with its beak. This thrust, I am sure, is generally given with sufficient violence to pierce one nearly through an eye, even were the lid instinctively drawn down to protect that organ. By such a blow it can easily stab a large frog through and through its head, impaling the creature upon the end of its beak,—a feat I have seen the bird perform. A loud blowing noise accompanies this attack of the Bittern, which varies in its intensity,

—depending apparently much upon the degree of anger to which the bird has been excited by its tormentors. My captive behaved much in the same way when held up by the legs in front of another person, and one had to exercise great care to avoid its quick and well-delivered thrusts. At the end of three or four days, it having eaten nothing up to that time, nor drunk any water, I offered it a live medium-sized frog to try its appetite. It promptly laid out that poor batrachian by a few telling stabs given with its beak, sending one home every time the animal moved a limb. Immediately after killing it, it was picked up with the bill, and throwing back its head the bird attempted to swallow the morsel. In this it failed after several trials, and finally abandoned it for good and all. This Bittern lived twelve days without ever having eaten a single thing or swallowed a drop of water. It passed several thin, cream-colored evacuations from the bowels every twenty-four hours, and died, apparently without any pain, in a squatting position, absolutely unruffled in plumage, on the evening of the twelfth day—a plucky fowl to the instant of its death.

There is one very interesting point to observe here, and it is the fact that the lower the position a bird occupies in the system the greater the length of time it seems to be enabled to go without partaking of any nutriment whatever. Gannets and Cormorants will live nearly a month without either eating or drinking anything, while on the other hand any of the small Passeres will succumb in a few days to such treatment. In this connection it is important to note that many lizards will live several months without consuming a morsel of food or a drop of water. This may be another particular in which the lower birds approach their reptilian kin.

While dissecting this Bittern with the view of saving its skeleton, and observing what else I could in its anatomy, I found that it possessed a peculiar arrangement and modification of the vertebræ and certain muscles in the upper third of the neck, much as we find it in *Plotus anhinga*, and in a less marked degree in Cormorants, the Gannets, and Pelicans. This modification, which is associated with the power of the birds mentioned (especially the Darters and Bitterns) of giving a quick thrust with the beak, has been well described by Garrod, a paper among his 'Collected Scientific Memoirs,' and by Donitz, and is well worthy of close study and comparison. Garrod does not mention having observed it in *Botaurus* and its allies.—R. W. SHUFELDT, *Takoma, D.C.*

Tringa alpina on Long Island, New York.—On Sept. 15, 1892, I secured a European Dunlin at Shinnecock Bay. During a week's trip I secured only one *T. a. pacifica*. The specimen was identified through the kindness of Mr. F. M. Chapman of the American Museum of Natural History. Coues says of this species, "A straggler to Greenland"; Ridgway, "Accidental or casual in eastern North America (west side of Hudson Bay)." Its occurrence in the United States has heretofore seemed doubtful.—CURTIS CLAY YOUNG, *Brooklyn, N. Y.*

The Migration of Numenius borealis in Massachusetts in 1892.—Although there was at the right time considerable weather sufficiently severe to deflect and land Golden Plover (*Charadrius dominicus*), either it was insufficient to cause a like result on such powerful fliers as Eskimo Curlews, or none were passing our coast at the time. I have consequently but a meagre record to present. At Nantucket on the afternoon and during the night of Aug. 26, it blew hard (at rate of 37 miles an hour) with rain. On the next day two birds were shot, two were seen also on Tuckernuck Island; these were the first birds of the season. None were seen between this date and Sept. 1, when one rather lean bird was shot; the wind was west to north, a fresh breeze, late in the afternoon it backed to northeast. My next record was on Sept. 6 when five birds were shot on Tuckernuck Island, and three seen and one shot on Nantucket. No more were noted until Sept. 15, on which date three were seen and one killed on Nantucket. On the afternoon of the 14th the wind was strong, southeast, increasing to rate of 35 miles an hour at midnight, with hard rain. Towards morning of the 15th the wind changed to northwest, a light breeze. These instances cover all the birds noted during the entire season on the above islands. Mr. William Everett of Dorchester, Mass., who visits Prince Edward Island regularly every year, informs me that seven Eskimo Curlew were shot at Alberton, and one at Darnley, on or about Aug. 28, which were all that he heard of during the entire season.—GEORGE H. MACKAY, *Nantucket, Mass.*

Charadrius squatarola.—Mr. William Everett of Dorchester, Mass., has furnished me with the following information. At Malpeque, Prince Edward Island, August 22, 1892, during mild, pleasant weather, a very large flight of Black-bellied Plover appeared, the number that landed being estimated at about one thousand. It was composed entirely of adults with black, and black-and-white, breasts. They established themselves in several fields at Lower Malpeque where they are locally known as 'Sea Plover.' On the night of Sept. 14, 1892, it rained and was misty with southwest wind. On the next day the greatest number of young birds that was ever noted in this vicinity at one time was seen in and flying about the fields of Lower Malpeque. While driving around late in the afternoon as many as one thousand birds (estimated) were seen in four fields. Many others were noticed flying, which did not stop. All the adults mentioned above and which also had frequented the same fields where the young birds were now, had previously departed.—GEORGE H. MACKAY, *Nantucket, Mass.*

The Migration of Charadrius dominicus in Massachusetts in 1892.—At Nantucket, Aug. 18, a flock of fifteen Golden Plover was seen, the first noted this season. Aug. 20, I saw five scattered birds. I think there must have been a storm at sea recently, for the surf was running high and breaking over the beaches into the ponds near the shore on the south side of the island, notwithstanding the fresh north wind. Large numbers of

birds must have passed over the island tonight, as they have been heard whistling during the greater part of the night; none stopped. This was the first movement noticed this season. In the afternoon the wind changed to west by south, clear, warmer and pleasant.

Aug. 25 I saw a flock of twenty two, and shot three of them. The wind was south by east, fresh, in the forenoon; more moderate in the afternoon; the weather was thick outside the island, barometer 29.75 and falling. Aug. 26, I was driving over the Plover ground at daylight. The wind remained southeast up to 3.30 A.M.; at 4.10 A.M. a thunder and lightning squall with severe rain and wind came blowing north by east; the wind remained so until eight A.M. when it hauled northeast, moderate and warm; at one P.M. wind hauled east and it commenced to rain again, having ceased from eight A.M. until this time. I saw one flock of fifteen, another of nine, another of twelve, and two or three scattering birds; during the afternoon the wind was blowing at the rate of thirty-seven miles an hour with hard rain. A large number of Golden Plover landed at night, this being the second movement. Aug. 27, I was out at daylight. The weather was very thick, with wind northeast and a little rain. I saw a good many Plover, in fact more than for the past three years put together. In the afternoon the wind backed to north by west, and later to north, the weather continuing thick, almost rain at times. Much to my surprise I saw one flock of about fifty birds go up in the air and leave on migration, evidently not liking the surroundings. About three hundred birds were shot that day on Nantucket and Tuckernuck Islands. The greater part of the birds left in the afternoon and night. I hardly expected they would go, although the wind was fair (north), for the weather was very unsettled. I judge they considered anything preferable to remaining, as they were being greatly harassed. I never in my experience knew the Plover to be so restless and unwilling to remain as they appeared to be. Instead of coursing over the ground low down, as is their usual custom after landing, they kept up in the air, in great part at an altitude of forty to one hundred yards, evincing the strongest disposition to continue migration, notwithstanding the unsettled condition of the weather, which did not apparently warrant their leaving. I noticed also that most of the flocks led to the windward, which is the reverse of what is usually the case when here.

Aug. 28, I was driving over the ground as usual at daylight. The wind was north, and increasing, the weather very misty with rain at intervals during the greater part of the day. The only birds left were some scattering flocks and about seventy to one hundred birds in a field which is preserved. No one shot many birds, and the aggregate killed was very small. Aug. 31, the only birds seen were those living in the field which is preserved. Sept. 1, I drove over the western ground and saw about a dozen Plover altogether, one of which was a Palebelly (young bird), the first for this season. The wind was west by north, then west, from which point it backed to northeast. On Sept. 2 and 3 there was nothing to note.

Sept. 4 was cloudy with wind southeast, then east, then northeast; it began to rain in the afternoon; at ten P.M. it was raining and blowing hard; it was thick during the night with wind north-northeast, with rain at intervals; from three until ten A.M. it blew very hard, with rain at times. Nothing to note. Sept. 5, I was on the western ground at daylight. The wind kept backing until it reached southwest in the afternoon with clear weather, and bright moon at night. I rather expected some birds to come on but none landed. I was out until 5.30 P.M.

The weather was pleasant and clear, and no birds came, until Sept. 15. Tne previous evening the wind was strong, southeast; at midnight it was blowing thirty-five miles an hour and raining hard, continuing until near morning when the wind changed to northwest, a light breeze. I saw two flocks of young birds of about twenty-five and thirty birds respectively, the larger flock, although undisturbed, I saw mount up into the air and go on migration. These two flocks were apparently new arrivals. I also saw several flocks of black-and-white-breasted birds which also, I think, landed the night before. On Sept. 16 I saw in all about one hundred Plover, but I am quite certain the greater part of them were from the field which is preserved. Sept. 18 I drove eastward where we saw about fifty birds (some of those which were living there). In the afternoon we saw a flock of about thirty young birds (probably the flock noted on Sept. 15), and another flock of five old and one young bird.

For the next week the weather was clear and pleasant, but with considerable wind from west to north. No new birds came on as far as I could ascertain. I saw about one hundred young birds on Sept. 25, but I am not certain that I did not see some of them more than once, as these were birds that were living on the island.

At about four o'clock on the afternoon of Sept. 26 a flock of Plover containing about forty birds was seen flying towards the west from the northeast, they were pretty well up in the air. During the following week (to Oct. 3) the weather was clear and pleasant. I drove over most of the ground twice, and made inquiry, but did not see or hear of any new arrivals. I regarded the migration as over for the season at that time, though it was still possible, but not probable, that some young birds might yet be passing.

Summary. — The season of 1892 has shown much weather favorable for landing Plover; it has also shown that more birds, both old and young, did land than for the previous three years combined. It also showed that on Aug. 27, the afternoon following the night of their landing, owing to their being greatly harassed, the larger portion of the birds departed, notwithstanding that the weather conditions were very unsettled and apparently scarcely warranted their leaving. Also that while they were on the islands of Nantucket and Tuckernuck they manifested the greatest uneasiness and reluctance in remaining, leading up to windward well up in the air with the possible idea of turning back and plainly showing to me, as far as I was able to interpret their actions, that they were remaining much against their will, seemingly determined to leave at the earliest

possible moment; this they did in great part late on that afternoon and during the night of Aug. 27, having landed on the night of Aug. 26. Those birds which found rest in a certain preserved field would immediately return to it and remain there, if shot at while flying outside. These particular birds continued to reside in this field until one hundred and thirty-two had accumulated, when the owners of the field commenced to shoot them; this drove them from this place to others where they were at once pursued and shot until but few remained by Oct. 1, 1892.

My friend Mr. Wm. Everett, of Dorchester, Mass., sends me the following note: At Malpeque, Prince Edward Island, Aug. 23, 1892, during mild and pleasant weather, the first flight of Golden Plover probably landed on the night of Aug. 22, for they were first seen the next day. A few hundred birds remained in the various fields, but the greater part of them passed south. There were but few Plover shot here this season. — GEORGE H. MACKAY, *Nantucket, Mass.*

Black Vulture in Maine.—Under date of November 3, Mr. Geo. A. Boardman writes me as follows: "Our local taxidermist (Calais, Maine) received a Black Vulture (*Catharista atrata*) which was killed here. This makes the sixth I have known to be taken in this vicinity, while only one specimen of the Turkey Buzzard (*Cathartes aura*) has been secured in this locality. The latter I consider much the more northern bird." —WILLIAM DUTCHER, *New York City.*

Some Additional Eastern Records of Swainson's Hawk (*Buteo swainsoni*).—Proofs that Swainson's Hawk visits New England at no very infrequent intervals and perhaps in some numbers, multiply steadily if slowly. I now have two fresh specimens to report; one killed at Essex, Massachusetts, May 29, 1892, the other near Calais, Maine, about October 8, 1892.

The Essex specimen was sent in the flesh to Mr. M. Abbott Frazar, who mounted it and afterwards sold it to me. It is a fine old bird, a female, in the melanistic phase, wholly dark colored (sooty or clove brown) both above and beneath, save on the bend of the wing, which is whitish, the under surface of the tail, which is banded with ashy white, and the under tail-coverts and crissum, which are soiled white with faint rusty and brownish markings. There is also a little half-concealed whitish on the forehead and chin and the feathers on the back are bordered with faded brown. Mr. Frazar, whose experience in such matters entitles his judgment to much weight, tells me that the ovaries were undeveloped and that the bird was evidently not in breeding condition, a point of some importance in view of the date of its capture. Of the two Massachusetts specimens previously recorded, one (in the Peabody Museum) was taken in the winter of 1871–72 (Allen, Bull. Essex Inst., X, 1878, p. 22), the other (in the present writer's collection) in September, 1876, at Wayland (Brewster, Bull. N. O. C., III, Jan., 1878, p. 39).

The Calais bird above mentioned was shot by a countryman and brought into town with some Ruffed Grouse. After passing successively through the hands of a provision dealer, who bought it of the countryman, of a lady (a Mrs. Ryder), who bought it of the provision dealer, and of a local taxidermist, by whom it was received and mounted October 10, it found a final and appropriate resting place in the well-known collection of Mr. George A. Boardman to whom I am indebted for these facts as well as for the following description of the specimen: "It is a young bird of unknown sex. The back is black with many of the feathers bordered with yellowish; the tail lighter than the back with about a dozen black bars; the head, neck, and lower parts fine, delicate yellowish, the feathers of the head and neck striped with black; the breast spotted coarsely along its sides, more finely across the middle, with black. The throat and tail coverts are yellowish white. Beneath the chin black markings, arranged in series, form a distinct mustache. With its generally ochraceous ground color and bold dark markings the bird is a strikingly handsome specimen." There are two known instances of the previous occurrence of this species in Maine, at Gouldsboro, Sept. 15, 1886 (Brewster, Auk IV, April, 1887, p. 160), and at Glenburn near Bangor, May 19, 1888 (*id.*, *ibid.*, V, Oct., 1888, p. 424).

In this connection it may be worth while to mention still another Eastern specimen of Swainson's Hawk which is preserved in the Greene Smith collection of mounted birds.[1] This specimen, so the label states, was killed in Onondaga County, New York, in October, 1877, and was "presented [to Mr. Smith] by T. Bex and Ed. Lodder of Syracuse." It is a young bird, of the light or normal phase, in fresh autumnal plumage. So far as I know, it has never previously been recorded.—WILLIAM BREWSTER, *Cambridge, Mass.*

Swainson's Hawk in the East.—Two records of the occurrence of this Western *Buteo* hundreds of miles east of the eastern boundary of its habitat have come to my notice through Mr. Geo. A. Boardman of Calais, Maine, and Mr. L. S. Foster of New York City. Both individuals were immature birds, and were shot within six days of each other, although some hundreds of miles apart. It may be possible that a small eastward migration of this species took place in the early fall, and these records may be added to by the readers of 'The Auk.' Mr. Boardman says, "The Hawk is a young Swainson's, a fine specimen, and was shot Oct. 6, within six miles of Calais. It is the first one I have ever known to occur here. It is now in my collection."[2]

The New York specimen was shot by and is in the possession of Mr. W. Williams of Brooklyn, New York. It was examined and identified by Mr. Arthur H. Howell, who obtained the following information about the specimen: It was shot October 14, at Meadow Brook Farm, near

[1] Lately given by Mrs. Smith to the Museum of Comparative Zoölogy.

[2] This is the same specimen described above by Mr. Brewster.—EDS.

Cornwall, New York. When first seen it was on the ground, but on approach flew to a fence near by. On being shot at, it flew with a steady but leisurely flight to a tree, when it allowed an approach within easy gunshot. While on the tree it exhibited no fear, merely turning its head to watch the movements of its capturer. Mr. Howell adds that the specimen is a beautiful one, highly colored, and having considerable black on the under parts. The following measurements were taken from the mounted specimen: wing, between 18 and 19 inches; tarsus, 2 $\frac{9}{16}$ inches, middle toe, 1$\frac{3}{4}$; tail, 9. These large measurements would indicate it to be a female although the sex was not ascertained by dissection.—WILLIAM DUTCHER, *New York City.*

The Nest of Panyptila cayenensis (Gm.).—On Aug. 23, 1892 after an early morning trip in the woods, I had nearly reached the edge of the plantation when my attention was drawn to a mixed company of birds feeding on berries in an immense tree. The tree belonged to a species common in these forests, a giant among its surroundings, the trunk at least five feet in diameter and the first limb over seventy feet from the ground. Numerous vines of various sizes hung down from the limbs like ropes. Near the ground the trunk spread out into long, flattened arms and buttresses, giving it a diameter at the ground of over thirty feet. Among the birds were a flock of Yellow-tails (*Ostinops montezumæ*), two species of Toucans (*Ramphastos carinatus* and *Pteroglossus torquatus*) and some small Parrots too high up to identify. Wounding a Yellow-tail, I was endeavoring to keep sight of it, when a small bird dashed past and disappeared on the trunk of the tree about seventy feet from the ground. Looking in that direction I noticed a nest, eight or nine inches in length, hanging from the trunk, and so nearly resembling it in color that ordinarily it would have been passed unnoticed. The trunk was perfectly straight for a distance of seventy feet, at which point there was a division, the portion with the nest leaning very slightly, and the nest was attached to the smooth grayish bark on the under side of the trunk, hanging vertically and at the same time almost against the bark, rendering it a very inconspicuous object. The nest when first observed was still quivering from movements made by the bird, proving it to be made of some soft, yielding material. The nest almost exactly matched the bark in color; the entrance, at the bottom, was very large, nearly the diameter of the nest, which appeared to be about three inches at the lower end, with a slight bulging near the top. On shooting into the nest there was a struggle inside which shook it considerably, and presently the bird dropped to the ground. It was a *Panyptila cayenensis*, and on dissection proved to be a male, with the sexual organs only slightly developed.

Visiting the spot next day with a pair of field glasses, I tried to identify the material composing the nest, but beyond its having the appearance of being stuccoed with some substance resembling the bark in color, I could determine nothing. The bark was quite smooth, and the nest appeared to be glued on; although this was not positively ascertained to be the case.

This Swift is quite abundant here, as is also the small gray-rumped *Chætura*. They usually fly very high, though apparently not faster than the Chimney Swift of eastern North America. On cloudy afternoons, particularly after rainstorms, they often fly so low that specimens may be easily obtained. The ordinary note is a 'chee', or 'chee-ee,' rather long drawn out, and at times a 'chee-wee-wee-wee,' uttered in about the same pitch as the note of the Chimney Swift. Wounded birds utter a continual, squeaky, clicking note.—CHAS. W. RICHMOND, *Escondido River near Bluefields, Nicaragua.*

Sharp-tailed Finches of the New Jersey Coast.—While there has been every reason to expect the occurrence of both the Nelson's and the Acadian Sharp-tailed Finches on the maritime marshes of New Jersey during the migrations, there have not been, so far as I am aware, any actual records of their capture in that State. The only mention that I have seen of either race as a New Jersey bird occurs on page 541 of Dr. Nelson's 'Catalogue of the Vertebrates of New Jersey' where it is stated that *Ammodramus caudacutus nelsoni* is "common along the shore" and "breeds in the salt meadows." No mention whatever is made of *A. caudacutus*, so the natural inference is that *nelsoni* is the common breeding bird of the New Jersey coast. This, however, being quite erroneous, Dr. Nelson's remarks must be considered as belonging strictly to *A. caudacutus*.

In view of the above statements the following notes based upon collections made by Mr. I. N. DeHaven and myself may be of interest. *Ammodramus caudacutus* breeds abundantly on the salt marshes from Pt. Pleasant to Cape May Point and probably along Delaware Bay as far up as the salt marshes extend. A few of the birds winter on the marshes at Atlantic City, as specimens have been taken in January and February by Mr. DeHaven. These winter birds were extremely fat, but did not differ in plumage from late fall birds, and were in all respects true *caudacutus*.

A. caudacutus nelsoni occurs only as a migrant, and appears to be more abundant in the fall. A single specimen was taken at Atlantic City on May 9, 1892, by Mr. DeHaven, and on October 2 of the same year several were secured.

A. caudacutus subvirgatus was found associated with the other two races at Atlantic City on October 2, 1892, and a number of specimens were shot. It appeared to be more numerous than *nelsoni*, but less so than true *caudacutus*. This race apparently winters farther south for, as has been already stated, all the winter specimens so far taken by us in New Jersey were *caudacutus*. Doubtless more careful search will show the *nelsoni* and *subvirgatus* to be of regular occurrence in both migrations.

It may be of interest in this connection to record the wintering of *Ammodramus maritimus* in small numbers on the salt marshes of southern New Jersey, specimens having been taken by Mr. Wm. L. Baily on February 22, 1892.—WITMER STONE, *Academy of Natural Sciences, Philadelphia.*

Capture of the Louisiana Tanager at New Haven, Connecticut.—I made one of the most noteworthy captures here on the morning of Dec. 15, 1892, that I have ever taken, viz., a Louisiana Tanager (*Piranga ludoviciana*), a male in immature plumage. I believe the only other New England record is the one taken at Lynn, Mass., Jan. 20, 1878. My bird was exhibited to several persons while still in the flesh as proof of its actual occurrence here. It is not an escaped caged bird, as the feet and plumage clearly indicate.—H. W. FLINT, *New Haven, Conn.*

Dendroica kirtlandi in Minnesota. — I took an adult male Kirtland's Warbler on May 13, 1892, near Minneapolis. When first seen it was in company with White-throated Sparrows in a narrow hedge of small plum trees that divided two ploughed fields. It had flown down and was feeding on the ploughed ground, when I shot it.—H. M. GUILFORD, *Minneapolis, Minn.*

Occurrence and Breeding of the Kentucky Warbler in Connecticut.—On July 10, 1892, while passing through a piece of swampy woods in Greenwich, Fairfield Co., Conn., my ear was caught by an unfamiliar bird note in the underbrush near the path. A short search revealed a bird which I soon saw to be the Kentucky Warbler. Not having a gun at hand, I watched her for some time, suspecting from her manifest alarm that young were near at hand. Such proved to be the case, as a few minutes later I saw her feeding a well-fledged nestling, perched near by.

Returning at dusk, I was fortunate enough to find, a few hundred feet from the former locality, one of the parents, which I secured. It proved to be the male. The female and the young I was unable to find on either this or the several succeeding occasions on which I looked for them. This is, I think, the first record of its breeding in Connecticut.—CLARK G. VOORHEES, *New York City.*

Heleodytes vs. Campylorhynchus.—The name *Campylorhynchus* proposed by Spix[1] in 1824, which has long been used for a genus of Wrens, seems to be preoccupied by *Campylirhynchus* Megerle, a genus of coleoptera. The latter name was published in Dejean's 'Catalogue de sa Collection de Coléoptères,' 1821, p. 84, thus antedating Spix's name by three years. I have not had an opportunity to examine a copy of this edition of Dejean's Catalogue, but Professor Samuel H. Scudder of Cambridge, who has kindly verified the reference, informs me that the name appears on p. 84 without description or any indication that it is used for the first time. Seven species, however, are referred to this genus, and as several of them can be recognized, although now placed in other genera, *Campylirhynchus* Megerle is relieved from the imputation of being a *nomen nudum*.

[1] Aves Spec. Nov. Brasil., I, 1824, p. 77, pl. 79.

As both names are derived from the same roots, have the same meaning, and are practically identical, it is questionable whether the difference in the connecting vowel is sufficient ground for considering them distinct. In case *Campylorhynchus* Spix is rejected its first synonym, *Heleodytes* Cabanis,[1] seems to be the earliest name available for the genus of birds commonly known as the Cactus Wrens.—T. S. PALMER, *Washington, D.C.*

Salpinctes obsoletus in Washington and Oregon.—In his 'Notes on some Birds of Gray's Harbor, Washington' (Auk, IX, 310) Mr. Palmer quotes R. H. Lawrence as giving the Rock Wren a place in his list of the birds of Gray's Harbor, and considers its occurrence west of the Cascades as somewhat doubtful. In 'The Auk' for October, 1892 (p. 357), Mr. Lawrence repeats his statement that *Salpinctes obsoletus* was the species observed at Gray's Harbor and adds that it was also met with at Seattle. It certainly seems rather out of place to meet with this species in the heavy fir forests of the Northwest, but that it occurs cannot be questioned. I took a specimen on May 21, 1885, at the edge of a clearing in the heavy fir timber, a few miles west of Portland, Oregon, a country very similar to that about Gray's Harbor, where Mr. Lawrence met with the species.—A. W. ANTHONY, *Denver, Colorado.*

The Carolina Wren in the Lower Hudson Valley.—The occurrence of the Carolina Wren on the eastern slope of the Palisades furnishes a marked illustration of the influence exerted by river valleys in extending the range of species. While as abundant during the summer in this locality as in any part of its range, it is as yet a comparatively rare bird on the eastern shore of the river, and on the western shore is seldom found far from the cliffs of the Palisades. I have observed it at Fort Lee, New Jersey, and just below Piermont, New York, but for the most part my observations have been confined to the 'Under Cliff' road at Englewood. Here on July 3 a nest containing young was found. It was placed in a small pocket-like opening in the face of a perpendicular cliff fifteen feet from the crest of the Palisades and an equal distance from a ledge below. On the same day within a distance of a mile no less than *ten* Carolina Wrens were seen, and on returning to the place a week later six birds were seen. But, as before remarked, although so abundant here, the birds are comparatively rare in the adjoining country. My friend Mr. Evan Evans, who lives less than a mile west of the spot where the nest was found, tells me that he rarely sees this species except in the immediate vicinity of the cliffs. At West Englewood, distant three and a half miles, I have found one or two individuals each spring and fall, and it has seemed to me that the species was slowly becoming more regular. During 1892 I noted single individuals at West Englewood on May 20 and October 23, and also

[1] Mus. Hein. I, 1850, p. 80.

at Larchmont on Long Island Sound on July 18 and in Central Park, New York City, on August 29. Dr. Mearns does not include it in his 'Birds of the Hudson Highlands,' and Dr. Fisher tells me he has not met with it at Sing Sing. Mr. J. Rowley, Jr., informs me that at Hastings-on-the Hudson a few miles north of Yonkers he sees one or two of these birds each year. But the most interesting evidence concerning the Carolina Wren in the Hudson Valley is furnished by Mr. Bicknell whose notes were made at Riverdale on the eastern shore of the river, exactly opposite Englewood. Mr. Bicknell writes: "About Riverdale the Carolina Wren is certainly more common than it used to be. Up to 1879, when I found it breeding at Spuyten Duyvil, I regarded it as an accidental visitor. My brothers were close observers of birds before me, and they had never seen it, although one had been shot at Riverdale in the late autumn of 1873. Of late years I have come to look upon it as a regularly irregular visitor, and every year I expect to meet with it at least two or three times. . . . It has seemed to me the eastern shore of the Hudson gets the overflow from the Wren population of the slopes of the Palisades, which has undoubtedly been increasing. For years past on occasional visits to the Palisades from spring until late in autumn I have never failed to hear the Carolina Wren, and have frequently heard two singing at the same time. On one occasion I heard two singing and saw still another, all at the same moment." My own more recent experience with this bird on the Palisades, as herein recorded, confirms Mr. Bicknell's remarks, and it would appear that, having become permanently established there, it is gradually spreading through the surrounding country.—FRANK M. CHAPMAN, *American Museum of Natural History, New York City.*

Sitta canadensis appearing in Numbers in the District of Columbia.—Last autumn the writer collected birds quite extensively at Takoma, D.C., and vicinity, especially in the southern part of Montgomery County, Maryland. During all that time and the following winter not a single specimen of the Red-breasted Nuthatch (*S. canadensis*) was observed, and there is every reason to believe that they were not at all represented among the fall migrants of that season (1891–1892). This autumn, however, (1892) the case is entirely different, for in the same localities the bird came early, and in most unusual numbers. They have appeared in loose flocks, associated with the usual autumn small birds, as Juncos, Titmice, Wrens, etc., and upon several occasions one could count as many as thirty or forty of them from a single point of observation. There would be no trouble in collecting as many as fifty specimens in a day. Many birds of the year are among them, as is indicated by their duller plumage and less decided markings. A number of years ago I remember this species appearing thus suddenly one autumn in the neighborhood of Stamford, Connecticut, a place where the writer collected birds for a long time early in the sixties and where the species had not been noticed for many seasons.—R. W. SHUFELDT, *Takoma, D. C.*

Notes from Connecticut.—Among my notes for 1892 the following may be of interest, as relating to the vicinity of Bridgeport.

A fine male Carolina Wren in full song was shot April 8. I was attracted from a distance by the power and richness of its vocalization, and found it dodging in and about an immense pile of cordwood in a recent clearing.

On April 6, at Stratford, the *very* familiar cries of a Blue-gray Gnatcatcher attracted and held my attention for several minutes, when it passed beyond hearing. Although but a short distance away at first, it was not seen, barriers interfering with approach.

Fish Crows (*Corvus ossifragus*) were observed in small numbers early in March, having been rare the preceding winter, if present at all. The morning of March 26, which was warm and clear, they were very common in certain districts, compelling attention by their discordant voices and unusual numbers, evidently fresh arrivals for the most part. They were particularly noticeable until midsummer when they gradually became silent and inactive. Even until May 1 flocks of twenty or thirty were occasionally seen; soon after, however, they were reduced to groups of a few unmated or barren individuals, and widely dispersed, breeding birds. Much more suspicious than the common species, they force themselves upon the attention long before the nest is in sight, in most cases in this vicinity. April 29, at Fairfield, one sat by a nest eighty feet from the ground, and confessed ownership of its young in the latter part of May. On May 12 I took a set of four fresh eggs from a nest seventy-five feet above the ground. This had been commenced in April, and its completion delayed at least two weeks. May 16 I took five nearly fresh eggs of the Fish Crow and one of the Robin from a nest near the summit of an isolated white pine tree in a recent clearing of hardwood growth. Tall timber near by seemed to them less attractive. The female being shot, its mate remained sorrowfully calling for several days, when it again mated and probably met with better success, as they could be seen there till July. A set of five eggs was taken at Mt. Vernon, New York, May 15, 1888, from a nest fully sixty-five feet from the ground, in low, wet woods. They were somewhat common there at that time.

Four Lawrence's Warblers were within a radius of half a mile, three typical and one with the black obscured and the crown dull yellow-olive, as seen by Mr. C. K. Averill and myself. As did all the others, it sang precisely like the Blue-winged Warbler; but it was not secured, as we had no gun. One fine fellow frequented the growth on one side of a small piece of woodland until July at least, while on the other side and within a stone's throw a beautiful Brewster's Warbler spent the greater part of his time. The latter, after patient watching, revealed his mate, a Blue-winged Warbler, and a nest in course of construction. This was in the edge of a pasture bordering a lane and grove. It was poorly concealed in the dead grass at the base of a small shrub among scanty briars and the beginning of a scrub growth, and was plainly visible from any point several feet away. It was constructed as is usual with *Helminthophila*

pinus. When seen again, June 14, it contained four eggs, two of which were Cowbirds,' which were removed. Those remaining brought forth a pair of birds that, as they left the nest, could not be distinguished from normal young of the female parent, as would be expected, whatever the color of the male.

The Nashville Warbler probably breeds regularly throughout southern Connecticut and perhaps even in Westchester County, New York, as a pair spent the summer in Woodlawn Cemetery. I took a beautiful set of five fresh eggs in Bridgeport, June 6. The five nests I have seen were found by accident, mostly a few miles inland. In one place at Seymour, and almost within hearing of each other, five or six pairs have regularly nested for several years. With rare exceptions theirs are the best concealed nests of our birds.

The Worm-eating Warbler is a regular summer resident; I have found them in about every swampy or partly inundated wood, especially if with a rank growth of skunk cabbage. Twenty-five miles inland in the valleys I have also found them rather common, and breeding in the same situations and in kalmia thickets, generally not far from a brook or standing water.

The Hooded Warbler is common in this vicinity wherever the laurel grows in abundance, but is less so toward the central part (Seymour, etc.).

White-crowned Sparrows were abundant, in Stratford at least, during the middle of October (14th), and were by no means rare in the preceding May. At the same time in the spring there was also an unusual number of Bay-breasted Warblers, and in the latter part of the month Yellow-bellied Flycatchers.—E. H. Eames, *Bridgeport, Connecticut.*

On the Occurrence of Three Rare Birds on Long Island, New York.—**Strix pratincola**. — Mr. Wm. Conselyea of Brooklyn has a mounted specimen in his possession, which I examined and identified a short time ago, and which he has permitted me to record. He shot it at Hicks Beach, Long Island, about January 10, 1892. Mr. Conselyea was walking along the beach about four P.M. when he saw a large bird flying steadily and noiselessly over the sand hills towards him. He shot the bird, which makes the fourth record from Long Island[1].

Helminthophila celata.—This bird has been recorded from a number of localities in the Atlantic States, but never from Long Island. The nearest approach to our limits is found in a specimen taken at Hoboken, N. J., in May, 1865, by Charles S. Galbraith [Amer. Mus. coll. no. 39,669]. Dr. Edgar A. Mearns[2] refers to it as a "rare migrant" in the Hudson River valley, and cites a specimen from Highland Falls, N. Y.,

[1] For previous records see Auk, III. 439; V, 180; VIII, 114.

[2] 'A List of the Birds of the Hudson Highlands,' Bull. Essex Inst. 1878.

May, 1875, and two specimens noted by Mr. E. P. Bicknell at Riverdale, N. Y., October, 1876. Mr. W. E. Treat[1] records a specimen at East Hartford Conn., May, 1888, and Mr. Wm. Brewster[2] speaks of a number of other records from New England.

On October 12, 1892, at Flatbush, King's Co., New York, I shot a young male. It was in a hedge-row in company with great numbers of Myrtle Warblers, White-throated Sparrows, and a few other species. My brother and I were driving these birds along the hedge, watching for anything rare, and most of them were very alert and continued their flight at every motion we made. This bird, however, was sitting quietly on a bush, and was at once shot.

Turdus aliciæ bicknelli.—I shot two Bicknell's Thrushes on Oct. 5, 1892, at Rockaway Beach. They were not together, but at widely separated parts of the Beach. I found them exceedingly shy, and it was only after much watching and pursuing of all the Thrushes that were noticed that I secured them. Many Thrushes were observed, but no others of any species were identified, for the cedars which grow on the Beach, and the tangled thickets of briers, afford excellent concealment to ground-loving birds, and in these spots they remained despite our most persistent efforts to dislodge them. Hence it seems probable that some of these others also were *T. a. bicknelli* and that there was a small migration of them at that time.

I have already noted[3] the capture of this bird at Rockaway Beach on Oct. 5, 1889, and may mention the following cases of its occurrence in this region. Mr. Wm. Dutcher writes.—"My Long Island records of *bicknelli* are as follows: Oct. 1, 1881, two, Shinnecock Light; Oct. 23, 1886, one, shot at Astoria; Sept. 23, 1887, one or more, Fire Island Light; Sept. 18, 1889, one, Shinnecock Light. I believe them to be a regular migrant but not nearly so abundant as *aliciæ*." Mr. L. S. Foster writes me that he has three skins of this bird taken at the Statue of Liberty, New York Harbor, one Sept. 18-19, 1889, the others Oct. 11-12, 1891. I believe with Mr. Dutcher that this subspecies is a regular, though uncommon migrant.—ARTHUR H. HOWELL, *Brooklyn, N. Y.*

Rare Birds near Washington, D. C.—The spring migration, which is reasonably productive here about once in every four years, was remarkably so in 1892, in the number of rare and desirable birds it brought to local collectors. For the first three of the following records I am indebted to Mr. Frederick Zeller, a professional gunner, whose almost constant presence on the marshes, and excellent knowledge of local birds, enables him to detect and capture new or uncommon species in the District.

Tantalus loculator. — On July 2 Mr. Zeller brought me two females, adult and young. They were killed on the flats a short distance from the Washington Monument, and on the Maryland side of the Potomac. This is the first record of the species here in seventy-five years. According to

[1] Auk, V, 323.
[2] B. N. O. C., I, 94, 95, and Auk, III, 278.
[3] O. & O., XV, 170.
[4] Auk, III, 443.

Dr. Brewer (Water Birds of N. A., Vol. I, pp. 95, 96) two specimens were taken in the District in 1817; nothing is known as to their disposition.

Gallinula galeata. — On April 19 Mr. Zeller brought me a Florida Gallinule. While the species has been taken here before, still this is the first specimen existing in collections. A few days later, about April 22, Mr. J. D. Figgins secured a second specimen from Frederick, Maryland, and on August 12 Mr. Zeller brought me a young male.

Bartramia longicauda. — Some years ago the Upland Plover is said to have been seen on some hills overlooking the city, but no specimens are known to have been secured. On April 13 Zeller brought me two females killed from a flock of three on the flats. Subsequently a number were heard passing over at night. A few were seen early in August at Laurel, Maryland, and on August 2, about 9 o'clock in the evening, I heard one call as he passed overhead in a southerly direction.

Ægialitis semipalmata. — On Aug. 22 a young female of this species was brought me, having been killed on the flats near the city. This is the fourth record for the District of Columbia.

Empidonax pusillus traillii. — This has always been regarded the rarest of the Flycatchers, very few having been taken up to the present year. On and about May 18, for several days, they were quite common, and a number were taken by the collectors.

Xanthocephalus xanthocephalus. — A female was brought me on Aug. 29, that was killed from a flock of Blackbirds on the marshes adjoining the city. This is the first record for the District.

Ammodramus henslowii. — Although known from this region for many years, this has been considered one of the rarest Sparrows, although always found in one or two localities. On May 30, while exploring a locality about sixteen miles from Washington a large colony was found, extending over a considerable area, and probably over a much larger territory than that traversed.

Geothlypis formosa. — The Kentucky Warbler although a resident of the District is one of the rarest of the family, so much so that but few have been taken, and frequently several years elapse between captures, while the eggs are unknown in local collections. Mr. Henshaw found a vacant nest some years ago, but with this exception the actual nesting in this locality has remained unknown. On May 30 a trip to Johnson's Gully, sixteen miles south of Washington, revealed quite a number of these birds, and frequently they could be heard singing in two or three directions at once. While walking along an old cattle trail, I flushed a bird from a nest containing five eggs directly beneath my feet, and shot her to be sure of identification; the eggs were but little incubated. One week later, June 6, a second nest was found, containing four eggs, slightly incubated, in a location similar to that of the first, and but a short distance from it, and close beside a path. Both nests were at the bottom of the gully, beside the only path traversing its length, and were without the slightest attempt at concealment. — E. M. Hasbrouck, *Washington, D. C.*

CORRESPONDENCE.

[*Correspondents are requested to write briefly and to the point. No attention will be paid to anonymous communications.*]

A Neglected Branch of Ornithology.

TO THE EDITORS OF THE AUK:—

Dear Sirs, — Of all the characteristics of birds, in the popular estimation, there is probably no one which attracts more general attention than their covering of feathers, and indeed it is one of the most useful distinctions in defining the class. In view of this fact it seems strange that comparatively little has yet been published concerning the distribution of the feathers on the body, and undoubtedly the majority of people still suppose that feathers are as evenly distributed over the skin as is the hair of mammals. Scientists have of course for a long time known and spoken of 'pterylæ' and 'apteria,' and for fifty years at least these have been not uncommon terms. But since the publication in 1840, of Nitzsch's 'System der Pterylographie," there has been very slight advance in this branch of ornithology, and the little that has been published on the subject has been of a very fragmentary sort. Meanwhile the structure, development and growth of feathers has received considerable attention, especially of late years some important work has been done, and the number, form and comparative length of both remiges and rectrices have been carefully noted and much use has been made of such facts in the classification of birds. The presence of crests, ruffs, plumes and exceptional feathers of every sort is always recorded, while in elaborated descriptions of the larger groups, the presence or absence of an aftershaft and the condition of the oil-gland is frequently mentioned. As a matter of fact, however, none of these things are really concerned when we speak of pterylography, for by that term is meant the arrangement in defined tracts of the contour feathers, and for fifty years this interesting subject has been practically neglected while all other branches of ornithology have been making rapid progress.

There are two more or less probable reasons why pterylography has been so slighted. One, which seems to be the view of Professor Newton in his article on 'Ornithology' in the Encyclopedia Britannica, is that the work of Nitzsch is so carefully done that it is complete and leaves little if anything to be added. The other reason for neglect lies in the impression that there is little of practical value to be obtained from further prosecution of such a very technical branch of the science. If these reasons are closely examined, however, it will be readily seen that neither is tenable. While the work which Nitzsch did was not only very carefully done, but for that time very exhaustively, when we consider that he was practically the first to enter this new field, and so like all pioneers peculiarly liable to error, the possibility that careful study will show some mistakes in his

work, is by no means small. Furthermore, the investigations in avian anatomy since 1840 have so changed our ideas of the classification of birds, new and important truths may perhaps be learned from work which he has already done. The enormous increase in the number of known species since that time is another and good reason for believing that new and important facts remain to be discovered in this interesting field.

Since then it is evident that much might be added to the work which Nitzsch has done, the feeling that the subject is of such very slight importance is probably the real cause for its neglect, but careful thought will show that this is a serious blunder, for no investigation in nature can be unimportant if it is conscientiously and zealously worked out, and the number of problems to be solved is at least as great in pterylography as in many more popular branches. The relations between the distribution of pterylæ and the mode of life, or the speed of flight, or the protection of the body, or even the kind of food, have as yet been scarcely thought of, while the relative advance in spacial distribution from what are called the lower, to the higher forms may bring out new facts in the history of evolution. The generic, specific, and even sexual differences which may be found, require investigation and explanation, and these are only a few of the questions involved. But so little has yet been done in America that the mere recording in descriptions and figures of our thousand species will furnish ample occupation for a number of years yet. Thus it will be readily seen that this field of study, so sadly neglected in the past, especially invites the attention of scientists today. American ornithologists have had so much to do in making known the avifauna of our own country that they have a good excuse for having neglected the study of pterylography, but now at least the time has come when they should enter in and possess the field.

Dr. R. W. Shufeldt has already done some very interesting work in this line, and it was an article of his, published in 'The Auk' about three years ago on the pterylosis of certain western Pici which first awakened my interest in the subject. A perusal of Nitzsch's great work, together with some investigations of my own, aroused my enthusiasm over what seems to me a fascinating field for research, and the scarcity of literature on the subject has led me to make this appeal for an apparently neglected branch of ornithology.

HUBERT LYMAN CLARK.

Pittsburg, Pa., Dec. 13, 1892.

[Mr. Clark's letter calls attention to a most interesting and important field for research, in which as yet very little systematic work has been done, the subject proper remaining nearly where Nitzsch left it half a century ago. Many years since the present writer had the good fortune to become a student of zoölogy under the late Prof. Louis Agassiz at Cambridge, Mass., with a view to special work in ornithology. The first subject to which my attention was invited was the structure and distribution of feathers, and the classic work of Nitzsch was soon placed in my

hands. Many months during 1862 to 1865 were given to this fascinating study, with a view to the preparation and publication of a series of illustrated monographs of the pterylography of different families of birds, the Owls being the first it was proposed to treat methodically. Owing to lack of material and other circumstances the work was never completed, but my preliminary studies extended to the leading types of North American birds, and hundreds of preparations were made illustrative of the general subject. Studies of the pterylæ were made partly from freshly killed birds, but mainly from alcholic specimens, which were found to be an excellent substitute for fresh material when the latter could not be obtained. None of the results have as yet been published, and the field is still open. It was found that good taxonomic characters were furnished by the form and character of the pterylæ, as well as by the structure of the feathers themselves. Among the Flycatchers (Tyrannidæ) for example, good generic characters could be found in the distribution of the feathers on the throat and top of the head—as in the number of rows of feathers and their arrangement. Reference is here made to the subject merely to strengthen Mr. Clark's "appeal for an apparently neglected branch of ornithology."—J. A. ALLEN.]

NOTES AND NEWS.

PROFESSOR JOHN STRONG NEWBERRY of Columbia College died, after a long illness, at New Haven, Conn., December 7, 1892, at the age of 70 years. He was born in Windsor, Conn., in 1822, and was graduated from Western Reserve College in 1840, and from the Cleveland Medical College in 1846. In 1855 he was appointed assistant surgeon and geologist to the Government exploring expedition under Lieut. R. S. Williamson, examining the country between the Sacramento Valley and the Columbia River. Later he accompanied Lieut. J. C. Ives in his exploration of the Colorado River, during the years 1857–58. During the War of the Rebellion he was Secretary of the United States Sanitary Commission. At the close of the war he was appointed Professor of Geology and Palæontology at Columbia College, and in 1869 became State Geologist of Ohio. For many years he was president of the Torrey Botanical Club in New York City, and of the New York Academy of Sciences. Although distinguished in early life for his medical knowledge, and later as an eminent specialist in geology and palæontology, he has left his mark upon North American ornithology, through his field work in connection with the early Government expeditions to which he was attached. His report upon the birds of the route surveyed by Lieut. Williamson was published in 1857 in Vol. VI of the Pacific Railroad Reports of Explorations and Surveys.

DR. PHILO R. HOY, the well-known physician and naturalist of Racine Wis., died suddenly at Racine, Dec. 9, 1892, at the age of 76 years. He was born in Richland County, Ohio, in 1816, was graduated from the

Ohio Medical College in 1840, and moved to Racine, Wis., in 1850. He for many years was the most prominent naturalist of the State, holding for a time the position of naturalist on the Geological Survey, and was for four years Fish Commissioner, and later was for three years President of the Wisconsin Academy of Art, Science, and Letters. He is well known to the older ornithologists for his various papers on Wisconsin birds. These papers include 'Notes on the Ornithology of Wisconsin,' published in 1853; 'Some of the Peculiarities of the Fauna near Racine' (1874); 'Journal of an Exploration of Western Missouri in 1854, under the Auspices of the Smithsonian Institution' (1865), 'Man's Influence on the Avifauna of Southeastern Wisconsin' (1885), and numerous minor papers in various scientific journals.

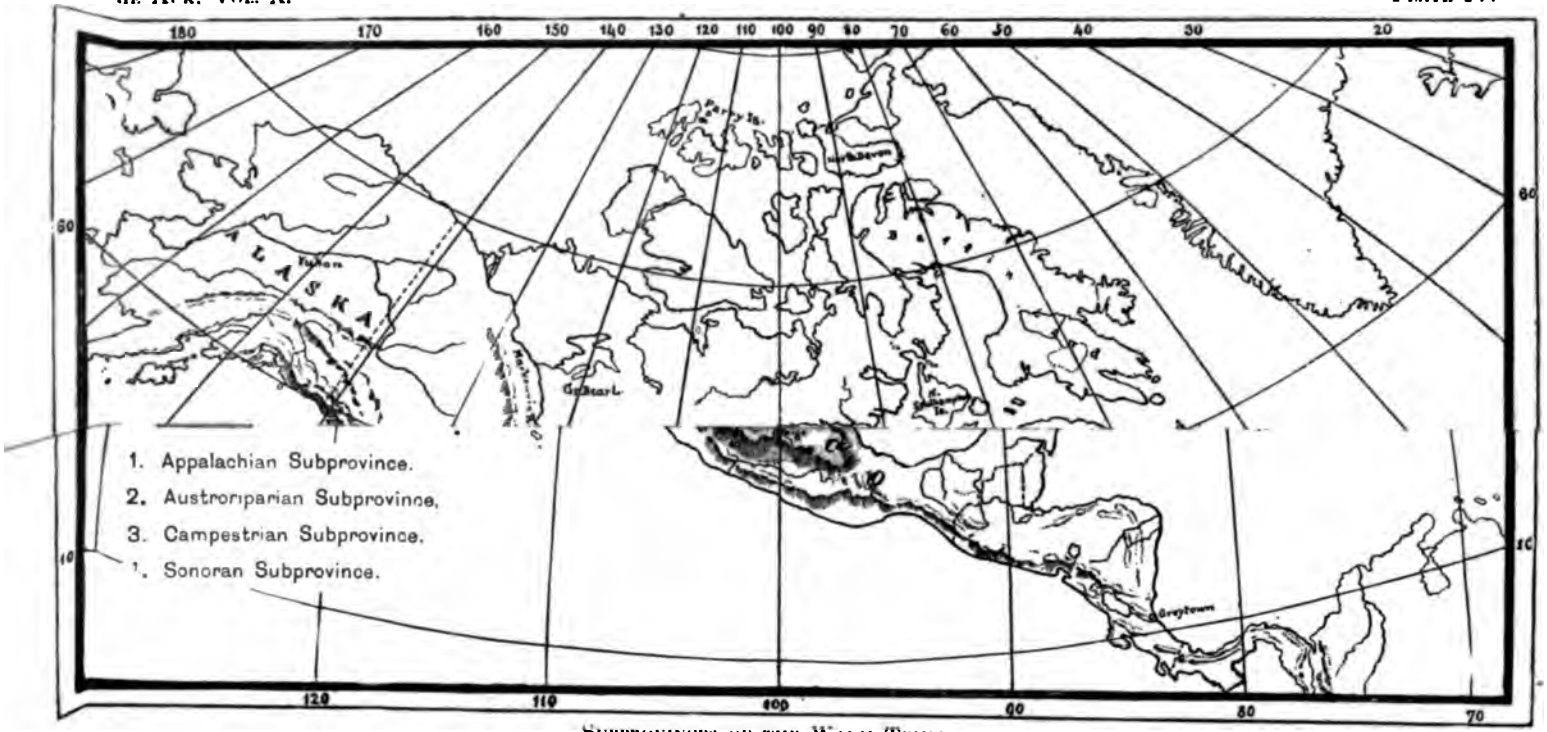
AT THE Tenth Congress of the American Ornithologists Union, Article V, Section 4 of the By-Laws was amended to read as follows: "The name of any member one year in arrears for dues shall be removed from the roll of membership; provided that two notices of indebtedness shall have been given him by the Treasurer, at intervals of three months; and no such member shall be restored to membership until he has been re-elected."

The following new rule was also adopted, to stand as Rule IX (the subsequent rules to be renumbered), as follows: "A committee on communications, consisting of three members, shall be appointed by the President each year, which shall receive from the Secretary all papers sent to him, from which said Committee shall select those to be read at the stated meetings."

The President appointed as this Committee for the ensuing year the Secretary and Messrs. Elliot and Allen.

THE BRITISH ORNITHOLOGISTS' CLUB was organized at the Mona Hotel, Henrietta Street, Covent Garden, London, October 5, 1892, Dr. P. L. Sclater, F. R. S., in the chair. Rules were proposed and adopted, and Mr. Howard Saunders was elected Secretary and Treasurer. It was determined to hold a meeting on the third Wednesday of every month from October to June inclusive, and that an abstract of the proceedings of the Club be printed as soon as possible after each meeting, under the title of the 'Bulletin of the British Ornithologists' Club.' Dr. R. Bowdler Sharpe was appointed editor, and R. H. Porter, 18 Princes Street, Cavendish Square, W. London, was selected as publisher. Three numbers have been issued, No. 3 bearing date Dec. 1, 1892. The 'Bulletin' offers a speedy medium for the publication of preliminary descriptions of new species, of which not less than 16 are described in No. 2, and 6 in No. 3. It also gives brief abstracts of papers, most of which will doubtless appear at length later in 'The Ibis.' At the second regular meeting, held Nov. 16, the chairman announced that the Club had already 72 members Evidently the plan meets a 'long felt want.'

A NEW monthly ornithological journal is announced to appear in Berlin in January, 1893, entitled 'Ornithologische Monatsberichte.' It will be under the editorship of Dr. Anton Reichenow, and published by R. Friedländer und Sohn.



SUBPROVINCES OF THE WARM TEMPERATE.

THE AUK:

A QUARTERLY JOURNAL OF

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THE GEOGRAPHICAL ORIGIN AND DISTRIBUTION OF NORTH AMERICAN BIRDS, CONSIDERED IN RELATION TO FAUNAL AREAS OF NORTH AMERICA.[1]

BY J. A. ALLEN.

THE PRESENT paper consists essentially of two parts. The first treats of the probable geographical origin and present distribution of the genera of birds represented in North America, regardless of any inferences that may be drawn from this general presentation of the facts of the case; the second relates to the subdivision of the continent into faunal areas of various grades, with reference to their relationships, classification and nomenclature. No very novel views, nor many new facts are presented, the paper being in great measure a restatement of generally known facts in a new sequence, with a view to giving them greater emphasis in their bearing upon the special subject in hand. The leading ideas here embodied have already been set forth by the writer in other connections,[2] but the evidence is here for the first time presented

[1] Read before the Tenth Congress of the American Ornithologists' Union, held in Washington, D. C., Nov. 15-17, 1892.

[2] See the author's recent paper, 'The Geographical Distribution of North American Mammals' (Bull. Am. Mus. Nat. Hist., Vol. IV, 1892, pp. 199-243, pll. v-viii), and the earlier papers there cited.

in detail from the standpoint of birds. As an introduction to Part I a few pages are devoted to questions having a more or less direct bearing upon the general subject.

I.—The Geographical Origin and Distribution of North American Birds.

It has long been recognized by nearly all writers on geographical biology that the two leading factors governing the distribution and dispersal of life over the globe are the land connections which now exist, or have formerly existed, between the principal land masses, and climate; and that by far the most potent of the climatic influences is temperature. In considering the faunal relations of North America to the Old World, it is important, therefore, to keep in mind the present slight separation of northern North America from Eurasia, and that, as currently believed by many geologists, the shallow basin now forming Bering Sea was at one time dry land, and thus formed a broad land connection between northwestern North America and northeastern Asia, during at least a portion of the Tertiary.

As is well known, a large proportion of the genera, and many of the species, of both animals and plants occurring in North America have a circumboreal distribution, even in many cases where their present habitats do not extend quite to the Arctic regions. Furthermore, that many genera, particularly of birds, which are at present limited to the warm temperate and tropical latitudes, are common to both the Old World and the two American continents. It is, in certain cases, hard to see how their present dispersion could have been brought about under the geographic and climatic conditions now existing. Geology here comes to our assistance, furnishing evidence that in earlier times the climate of the globe was not only more uniform, but also much warmer over the regions now buried half the year under snow and ice. It is well known that in Miocene times a warm temperate flora prevailed over the present Arctic regions, and that subtropical plants flourished in Central Europe and in corresponding latitudes in North America. Also that many types of mammals, now represented only in the tropics, formerly ranged over the greater part of the northern hemisphere, as shown by their fossil remains, long

since buried in the Tertiary deposits of both North America and Eurasia. Furthermore, there is abundant evidence of a considerable interchange of life between the two northern continents at a time when there was no climatic barrier, as now, to the northward extension of subtropic types; and that Eurasia was in part populated by types originating in North America; and also that North America has derived a portion of its life from the Old World. There is no reason to suppose that birds were then any less restricted in their means of dispersion than now, in comparison, for example, with mammals, insects, land mollusks and plants.

The past history of birds, while so defective in comparison with that of some other groups, affords proof of the former much wider dispersion of certain types than obtains at the present time. While for this class the geological record is so imperfect, it suffices to show that what are now strictly tropical genera, for example, formerly reached southern and central Europe. It also affords evidence that birds in Tertiary times were not so very different from the birds of to-day. The leading genera of the raptorial, gallinaceous, wading and swimming birds were much the same as now[1]; with them existed other genera which have since become extinct, while many of the now prevalent forms were absent, and have doubtless come later into existence. The

[1] Among the existing genera of birds found in the Tertiary of Europe and North America are the following, most of which date back to the Miocene, and some to the Eocene.

Struthio	Olor	Columba
Colymbus	Phœnicopterus	Buteo
Podiceps	Leptoptilus	Aquila
Podilymbus	Ibis	Falco
Uria	Ardea	Milvus
Larus	Grus	Strix
Sterna	Rallus	Bubo
Puffinus	Fulica	Psittacus
Phaëthon	Phalaropus	Picus
Sula	Scolopax	Leptosoma
Phalacrocorax	Tringa	Trogon
Pelecanus	Totanus	Callocalia
Merganser	Numenius	Corvus
Anas	Charadrius	Scolecophagus
Spatula	Coturnix	Passer
Anser	Phasianus	Sitta
Branta	Meleagris	Motacilla

fragile nature of most bird skeletons, and the small size of the greater part of the species, and the fact that only those of more or less aquatic habits would be liable to rapid entombment under conditions favorable for their preservation, are circumstances which render hopeless any expectation of the future discovery of the ancestral lines of the great bulk of our present avian fauna.

Two hypotheses, however, may be hazarded regarding the present limited distribution of many groups now restricted within comparatively small areas. First, that they had not only a local origin, but that for some not very obvious reason they have always had a local distribution, as for example the Todies in the West Indies, and various South American and tropical Old World types. Second, that they have become specialized since the close of the Tertiary, with adaptations to a tropical or semi-tropical environment.

There is evidence that towards the close of the Tertiary a marked change in the earth's climate took place, culminating in the Glacial Period, during which the whole northern half of the northern hemisphere became covered with a heavy ice cap, lasting for possibly thousands of centuries, and extending its chilling influence nearly to the northern tropic. The rise of the glacial period was of course gradual, and the southward progress of the great ice cap drove before it all forms of life capable of any considerable power of locomotion, while those unable thus to escape must have perished from cold. There was hence a great crowding together of exiles from the north into the more favored regions to the southward, leading to an intense struggle for existence, and a weeding out on a grand scale of forms least fitted for the contest. This period must thus have been one of great activity in the evolution of new types. Opportunity was given for the gradual adaptation of many forms to a lower temperature than that to which they had been accustomed, and to an enforced change of food. The recession of the ice fields was accompanied by the gradual extension northward of habitable land. A broader area becoming available in summer than in winter an annual migration for a greater or less distance on the part of the pioneer life became a necessity. Finally the ice receded to its present limits and the whole north, under radically altered climatic conditions, became again available for occupation by the more or less modified descendants of the pre-glacial exiles. To some of

these a comparatively low temperature had doubtless become congenial, and from them may have been derived the distinctively arctic and subarctic birds of the present age. They belong mainly to our present circumboreal genera, and are unrestricted by climatic conditions in their dispersal throughout the arctic and subarctic regions.

Other forms proved less flexible, and remained in latitudes more nearly corresponding to the climatic conditions of preglacial times. They had, however, before the beginning of the Glacial Period, become broadly dispersed, and now are found in widely disconnected areas. We have thus a reasonable explanation of the disconnected distribution of congeneric species in such groups as the Tree Ducks, Egrets and Herons, Spoonbills, Flamingoes, Snakebirds, Gannets, Gallinules, Barn and Pigmy Owls, Kites (genus *Elanus*), Trogons, Barbets, Kingfishers, Swifts, Goatsuckers, Piculets, and a few Passerine birds. On the other hand, doubtless many of the peculiar tropical types of land birds were already restricted to somewhat near their present limits, and that they have never had a much wider dispersion than they have at the present day. Many of them are also possibly of comparatively modern origin. It is only on this supposition that we can account for the numerous peculiar types that at present characterize the subtropical and tropical areas of the several continents.

It is not probable, for example, that such exclusively tropical American families as the Formicariidæ, the Dendrocolaptidæ, the Galbulidæ, the Todidæ, the Toucans, the Motmots, the Cotingas, etc., have ever had a much wider range than now. It seems also probable that such distinctively American types as the Hummingbirds, the Icteridæ, the Tyrant Flycatchers, the Tanagers, the Vireos and the Mniotiltidæ, which for the most part have their centers of abundance in the tropics, with merely outlying members in temperate North America, have never had a wider range than at present, and that most of their outlying genera and species have, under the intense struggle for existence in the overcrowded tropics, become gradually somewhat modified to adapt them to slightly more boreal conditions, thus in course of time more or less extending the general habitat of the families to which they respectively belong. At the far north they are still cut off from further extension by an insuperable

climatic barrier, and have thus been unable to reach any part of the Eurasiatic continent.

The Glacial Period and the change of climate it produced has not only had a profound and permanent influence upon the distribution of life in the northern hemisphere, but proved a powerful agent in the evolution of new types, and in the extinction of old ones; it also left its impress upon the majority of northern birds through the development in them of the habit of migration: for it is now generally conceded that this habit must have originated in consequence of the great reduction of temperature beginning about the close of the Tertiary. Prior to this period, owing to the comparatively uniform climatic conditions then obtaining almost everywhere, there could have been no necessity for extended periodic movements. Later a nearly uniform temperature throughout the year gave place in northern latitudes to warm summers followed by winters of great severity. During the waning of the ice period the area offering a congenial summer home to a great multitude of birds became greatly extended, from which, however, they were driven by semi-arctic winters to seek favorable winter haunts further southward.

We have here what seems a natural and reasonable hypothesis for the origin of migration, and one now currently accepted by ornithologists. In this way, it is believed, the habit of migration not only originated but has become established as an irresistible hereditary impulse, as inherent and mandatory as the 'instinct' of reproduction.

In this connection, a few words may not be out of place respecting the question, Why do birds migrate? In considering this question, it should be borne in mind that there is everywhere, and has ever been, a constant and intense struggle for existence—that throughout nature the birth rate is far above the possibilities of permanent increase. Hence, in the bird world, as elsewhere, every station affording favorable conditions for existence must be occupied; there can be no unutilized areas. Many birds are organized to subsist only upon insects or soft fruits, or upon both combined; such food abounds in summer far to the northward of where it can be obtained in winter. Thus some of our Swifts, Swallows and Flycatchers range in summer almost to the borders of the Arctic Circle, where for a few weeks in summer they find abundance of food and a congenial temperature. Here they

bring forth their young, but are forced to retire at the approach of autumn, retreating gradually before the southward advance of colder weather, passing through the middle latitudes in September, and reaching the tropics in October or November, the time varying more or less with different species. Here they remain till the increased warmth of March or April, or the stimulus of the approaching breeding season admonishes them of the necessity of revisiting their breeding stations, when they begin to retrace the journey toward their summer haunts, keeping pace so exactly with the advance of the season as not to lose even a day of the brief interval available for their sojourn in their far northern home. They are thus wanderers—exiles, as it were,—for three fourths of the year. Evidently our northern-breeding insectivorous and berry-eating birds could not survive a winter at their breeding grounds. They might perhaps be able to pass the whole year in the tropics, or in the lower temperate latitudes,—at the risk, however, of over-crowding the regular occupants, and also of leaving a habitable area unoccupied. As a matter of fact, nature not only 'abhors a vacuum,' using the phrase in a strict sense, but allows no waste places; living space is always at a premium. Near relatives of our subarctic and cold temperate insectivorous birds are found in the tropics and throughout the temperate latitudes; while the tropical forms are non-migratory, those breeding in the temperate latitudes are less so than their more northern kin; they remain, owing to the longer summer, for a greater length of time at their breeding stations and have a shorter journey to reach their winter haunts.

This may serve as a general illustration, showing that the absence of proper food in the high north forces the summer insectivorous birds to leave these regions for warmer latitudes, where can be found the food their peculiar organization renders necessary. In short, as our knowledge of the habits and migrations of birds increases, it becomes more and more evident that the cause of the autumnal migration is failure of proper food at the breeding station.

Why migratory birds ever leave their winter haunts seems at first sight less obvious, since in most instances it can hardly be due to failure of the food supply, nor to any absolute incompatibility of climate. The return in spring is often attributed to strong home love, evidence of the existence of which is shown by the

return of birds to the same locality—even to the same nesting site—for many successive years. There is so much indubitable proof of this, that it is commonly assumed as the rule in most species. It is certainly beyond question that birds do not select their breeding stations in any hap-hazard way, journeying north along a vague course and stopping to nest wherever the proper conditions of season and other surroundings happen to prove favorable. Hence the impulse that governs their spring movements has been loosely termed the 'home instinct.'

If we consider that migration consists really of two movements—that is from the breeding station to the winter quarters and then back again—and that the one movement is the necessary complement of the other, it is hardly necessary to seek for a separate cause for the two movements; the two together constitute migration in a complete sense, which, as already explained, is an inherited habit,—an inherent, irresistible impulse, closely blended with the function of reproduction. The promptings which lead to the migratory movement, respectively in fall and spring, have unquestionably a different origin; the autumnal movement being doubtless prompted by a reduction of temperature and a failing food supply, while the spring movement is incited by the periodic activity of the reproductive organs, resulting in the necessity for the return of the species to the peculiar conditions and surroundings to which for long ages it has been undergoing special adaptation—in other words, to its home.

In the present paper, North America is considered in its faunal rather than its geographical sense, and in the synopsis here following the area covered by the A. O. U. Check-List and its Supplements is the region mainly considered, namely, North America north of Mexico, but including the peninsula of Lower California. The number of species now recognized in the A. O. U. Check-List as occurring within this area is about 795, with nearly 270 additional subspecies, making a total of about 1065 species and subspecies. These are arranged under 303 genera, with about 65 additional subgenera. Of these, however, 75 species and 25 genera occur merely as accidental stragglers from the Old World, the West Indies and Mexico. Deducting these as not valid components of the North American fauna, leaves about 720 species and 278 genera as legitimately North American, under the present restriction of the term. In the following

synopsis, subgenera will be in the main ignored, as their consideration is found to rarely modify the results derived from a consideration of the genera. Unless otherwise stated, the breeding range alone is taken into account.

The Pygopodes, as recognized in the A. O. U. Check-List, consist of three families, Podicipidæ, Urinatoridæ, and Alcidæ. The Podicipidæ constitute a small, well circumscribed group, of almost universal distribution, and of great antiquity, dating at least from the Miocene, with a closely related ancestral form in the Eocene. The number of genera recognized varies from two to half a dozen or more, according to the views of different systematists. Most of these so-called genera, however, are little more than subgenera, and as such are geographically limited to particular regions, some being tropical or austral, while others are confined to the temperate portions of the northern hemisphere, where they have a circumpolar distribution, as *Colymbus* and *Dytes* of the North American fauna. *Æchmophorus*, scarcely more than a well-defined subgenus, is confined to western temperate North America, though allied to a connectent form between *Æchmophorus* and *Colymbus* in South America. It is thus a distinctively American type. *Podilymbus*, consisting of a single species common to a large part of both North and South America, is quite sharply separated from the other members of the family, as a type peculiarly American, fossil remains of which, according to Dr. Shufeldt, occur in the Pliocene deposits of Oregon.

The Loons, forming the family Urinatoridæ, are distinctively northern, and to a large degree arctic or subarctic, though some of the species range in the breeding season throughout the cold temperate latitudes. It is a compact, sharply defined group, consisting of a single genus and less than half a dozen species; nearly all of them are circumboreal, none being distinctively American. The Loons form one of the early types, having survived with apparently little change from the close of the Eocene.

The Alcidæ, more numerous in genera and species than either the Grebes or Loons, are, like the Loons, a strictly northern type, several of the genera being among the most arctic of birds. With a superficial resemblance to the Penguins of the antarctic seas, but no close kinship, they may be regarded as their arctic repre-

sentatives in the rôle they fill in nature's economy. The Auks number 13 genera and about 24 species, displaying considerable diversity in size and form, and especially in the size and structure of the bill, and in the character of the nuptial ornaments. Considering their high northern range, one is struck with the greatly circumscribed distribution of many of the genera, only five out of the 13 being circumpolar, three being confined to the shores of the North Atlantic and Eastern Arctic Oceans, and five to the shores of the North Pacific and Bering Sea. Their limited distribution and diversity of structure indicate a plastic group of comparatively modern development. Being maritime species, none of even the non-circumpolar species can be claimed as distinctively either North American or Eurasiatic. In favor of their recent origin is the fact that, while almost arctic in habitat, few of the genera have acquired a circumpolar distribution, as they would in all probability have done had they existed in the same diversity in preglacial times. The locally restricted forms, moreover, occupy a region where food is exceptionally abundant.

Of the three families of Longipennes, — Stercorariidæ, Laridæ and Rynchopidæ, — the first is arctic, the second of world-wide distribution, and the third essentially tropical. Even the genera of the Longipennes are for the most part either circumpolar, cosmopolitan or tropicopolitan. Not a single genus is distinctively North American, and many of the species are either circumpolar or nearly cosmopolitan.

The Tubinares are so largely pelagic, so wide-ranging, and for the most part so little known as regards their breeding stations, that they will be dismissed without further consideration.

Of the six families of Steganopodes four — Phaëthontidæ, Sulidæ, Anhingidæ and Fregatidæ — are essentially tropical; another, Pelecanidæ, is semi-cosmopolitan, being found almost everywhere outside of the arctic and subarctic regions. The remaining family, the Cormorants (Phalacrocoracidæ), is universally distributed, though the species are largely maritime rather than inland, where they frequent only the larger rivers and lakes. Not a single genus of this whole order is distinctively North American. They are all birds of strong flight, and are apparently old types which have long had a wide distribution, the remains of Gannets, Cormorants and Pelicans occurring in deposits of Miocene age in both North America and Europe.

The Anseres are also a cosmopolitan group, containing many genera of very wide distribution. Particular styles of the Anserine type, however, have been developed over particular regions, as in South America, Australia, and in the Old World tropics. Of the 23 North American genera four only are peculiar to this continent, namely, *Lophodytes*, *Charitonetta*, *Camptolaimus*, and *Chen*, closely allied respectively to the circumpolar genera *Merganser*, *Glaucionetta*, *Somateria* and *Anser*, and are thus obviously derived from northern stock. *Histrionicus* is also almost wholly confined to the northern half of North America, while *Arctonetta* and *Philacte* occur only along the arctic coasts of Alaska and Siberia, like several of the genera of the Alcidæ. *Dendrocygna* is tropicopolitan, barely reaching the southern border of the area here under consideration. *Anas*, *Dafila*, *Spatula*, and *Erismatura* are nearly cosmopolitan. The remaining 14 genera of Ducks, Geese, and Swans are circumpolar, and most of them pass the breeding season in the cold temperate or subarctic regions. Thus of the Anseres only about one sixth of the genera are distinctively North American, and in every case are only slight modifications of circumpolar types, and hence of boreal origin, of probably comparatively recent date.

The Odontoglossæ, or the Flamingoes, are tropical,—a small, structurally widely isolated group, dating at least from the Miocene. A single species barely reaches our southern border, though in Pliocene and Post-Pliocene times Flamingoes ranged much farther north than now, both in Europe and North America, and were doubtless more numerous in species, the Flamingoes being a waning group.

Of the Herodiones, the Spoonbills, the Ibises, and the Storks are for the most part tropical, and hence do not enter prominently into the North American fauna. *Ajaja* and *Guara* are tropical American; *Plegadis* is subcosmopolitan and slightly more northern; *Tantalus* is also essentially tropical American, but has closely related forms in the Old World tropics. Our Herons all belong to nearly cosmopolitan genera and subgenera, many of the species being closely representative of Old World forms of corresponding latitudes. The North American Herodiones thus present no forms distinctively American.

The Paludicolæ afford us one form, *Aramus*, peculiar to America, but it barely reaches our southern border. Of the

other genera, *Grus* is common to the whole northern hemisphere; *Rallus* and *Porzana* are almost cosmopolitan, as are likewise *Gallinula* and *Fulica*, leaving only *Ionornis* as peculiar. This, however, is tropical American rather than North American, and has closely allied forms in the Old World tropics. The group is thus not only widely dispersed but of known great antiquity, the fossil remains of *Grus*, *Rallus* and *Fulica* having been found in the Eocene and Miocene deposits of Europe and in the Pliocene of North America.

The six families of the Limicolæ also afford very few peculiar North American genera, and these occur where, at first thought, they would be least expected, namely, among the Snipes and Sandpipers. Of the Phalaropes *Steganopus*, a subgenus of *Phalaropus*, is exclusively North American and the most southern in distribution of the three known species of the group, the others being both arctic and circumboreal. It is also of interest to note that, according to Dr. Shufeldt, its remains occur in the Post-Pliocene deposits of southeastern Oregon, rendering it certain that North America was within the pre-glacial range of the group.

The Stilts and Avocets, on the other hand, are of nearly world-wide distribution, being absent from only the cold temperate and arctic portions of the globe. The same is true also of the Oyster-catchers. The Surf-bird, genus *Aphriza*, is an isolated type of extended range on the Pacific coast of both North and South America during migration; its breeding haunts have as yet escaped discovery.

The two remaining families are the Scolopacidæ and the Charadriidæ. Of the former fifteen genera are represented in North America. One only, *Gallinago*, may be termed cosmopolitan. Of the other fourteen, six are circumpolar, and *eight* are distinctively North American, the North American genera being *Philohela*, *Macrorhamphus*, *Micropalama*, *Ereunetes*, *Symphemia*, *Bartramia* and *Tryngites*. Three of them breed from the cold temperate southward. Three of them are also restricted to eastern North America, while the other two—*Ereunetes* and *Macrorhamphus*, both monotypic—have each developed an eastern and a western subspecies. *Heteractitis* has a representative in Alaska and another in Eastern Siberia. Of the two genera of Charadriidæ, one, *Charadrius*, is arctic and circumboreal; the other, *Ægialitis*, is cosmopolitan.

We have now passed rapidly in review the Swimmers, Waders, and Shore-birds, with the following results: Total number of genera, 93; of which 74, or 80 per cent., are either cosmopolitan, tropicopolitan, circumpolar, or subcircumpolar, leaving 19, or 20 per cent., as American, of which only 11, or about 12 per cent., are distinctively North American; one half of these belong to the single family Scolopacidæ.

The North American Gallinæ number 12 genera, of which one, *Ortalis*, is tropical, while *Meleagris* is partly so. The remaining ten genera fall into the two subfamilies, Perdicinæ and Tetraoninæ. The four genera of the former are exclusively American; none reach the cold temperate zone, and all range to the southward of the United States; three of them are also exclusively western. Their metropolis is Mexico, where all occur, and where they have their greatest numerical representation. They have no representatives in South America, and no near relatives in any part of the Old World.

The Tetraoninæ are as emphatically northern as the Perdicinæ are southern. Of the six North American genera, three are circumboreal, one (*Tympanuchus*) is practically eastern, though formerly, in Post-Pliocene times, according to Dr. Shufeldt, ranging to Oregon; the remaining two, *Pediocætes* and *Centrocercus*, are western.

Of the eight genera of Pigeons, one, *Columba*, is subcosmopolitan; two, *Ectopistes* and *Zenaidura*, are North American, though the breeding range of the latter extends to the tropics; the remaining five are tropical American, of which four barely cross our southern border. The Columbine element in our fauna is thus obviously of tropical American origin.

Of the Birds of Prey, the three genera of Vultures are of course tropical American in origin, and still largely so in distribution, reaching only the warmer parts of North America. Of the sixteen genera of the Falconidæ, nine are either circumboreal or subcosmopolitan, and these all date back, with about the same distribution as now, to the Miocene, while some are known from the Eocene. The remaining seven genera must be ranked as tropical, five of them extending but a short distance into the United States. Hence not a single genus of this large family can be classified as distinctively North American. The same remarks are nearly true of the Owls, four of the twelve genera being cir-

cumboreal and mainly subarctic; six others are subcosmopolitan, while two only are American, namely, *Micropallas* and *Speotyto*, both of which have a rather restricted North American range. The latter doubtless reached North America from two sources, the West Indies, from which the Florida stock came, and Mexico, from which the western stock was derived.

Conurus, the only representative of the great order Psittaci, is of course only a northern outlier of the numerous group of tropical American Conures.

Our Cuckoos are all of tropical American origin, only the single genus *Coccyzus* having an extended North American distribution. *Geococcyx* is doubtless of Mexican origin. Our single genus of Kingfishers is subcosmopolitan.

Of our eight genera of Woodpeckers two, *Picoides* and *Dryobates*, are circumpolar, one being subarctic and the other of wide distribution; three are distinctively North American, while three others range at large over most of the two Americas.

Of the three genera of Swifts one, *Chætura*, is nearly cosmopolitan, one is exclusively North American, and one ranges over a large part of both the American continents.

All of the five genera of Goatsuckers, if *Antrostomus* be recognized as separable from *Caprimulgus*, are exclusively American; one only, *Phalænoptilus*, is restricted to North America, while *Nyctidromus* does not pass much beyond the Rio Grande.

Seven of the ten genera of Hummingbirds are essentially tropical, barely extending within our limits, while only one ranges over a very large part of the continent. Of the fourteen species, only one is eastern.

The Tyrannidæ, though preëminently a group of the American tropics, is represented by ten genera in North America; five of them, however, are scarcely entitled to rank as North American, and of the remaining five, only two, *Contopus* and *Empidonax*, reach the cold temperate latitudes.

The only American representative of the numerous Old World family Alaudidæ is the genus *Otocoris*, which ranges throughout the greater part of the northern hemisphere.

The Corvidæ are represented by eight genera, three of which are cosmopolitan and one, *Xanthoura*, is tropical. The other four are not only almost exclusively North American, but two of them are limited to the western half of the continent.

The Icteridæ are of course all American. Of the nine genera represented in North America, three (*Dolichonyx*, *Xanthocephalus*, and *Scolecophagus*) are exclusively North American. The six remaining genera range far into the tropics, two of them being mainly tropical; one of them (*Quiscalus*) is also mainly limited in North America to the eastern half of the continent.

The large cosmopolitan family Fringillidæ is represented in North America by thirty genera, twenty-one of which are strictly American and nine circumpolar. Of the twenty-one American, or twenty-three if we give generic rank to *Passerculus*, *Ammodramus* and *Coturniculus*, as I believe should be done, seventeen are exclusively North American; three others are mainly tropical, and three are shared in common by both North and South America. The Fringillidæ, although a cosmopolitan family, give a high ratio of forms peculiarly North American, amounting to fully 60 per cent. Furthermore, three of the North American genera are strictly western, and two strictly eastern, while five of the nine circumboreal genera are either arctic or subarctic.

The tropical American family Tanagridæ is represented by only two genera, namely, *Euphonia* and *Piranga*, only the latter extending over even the warm temperate portion of the continent, while the former barely reaches our border.

Of the six genera of Swallows none is essentially North American. *Tachycineta*, *Progne* and *Stelgidopteryx* range over both Americas; *Chelidon*, *Petrochelidon* and *Clivicola* are old World, each with a single species in North America.

Of the family Ampelidæ, the genus *Ampelis* is common to the colder parts of the northern hemisphere, but is most likely of American origin; the other genus, *Phainopepla*, is western and southern.

Lanius is the single representative of the very numerous and otherwise exclusively Old World family Laniidæ.

The Vireos range over both Americas, to which they are limited, with their metropolis in Middle America.

The Mniotiltidæ constitute the most characteristic family of North American birds, 70 per cent. of the twenty genera occurring in North America. Considering the family as a whole, three genera are exclusively West Indian; *Basileuterus*, which scarcely reaches our border, is continental and tropical; *Compsothlypis* and *Geothlypis* range throughout the warmer parts of

both continents, being tropical rather than North American, and nearly the same may be said of *Setophaga*. *Granatellus*, *Cardellina* and *Ergaticus* are Mexican and Central American, the two latter barely reaching our Mexican frontier. *Dendroica* is represented by about forty species, of which twenty-four, or about 60 per cent., may be considered as distinctively North American, while eleven, or 80 per cent., of the remaining species are West Indian; two are Central American and one occurs in the Galapagos Islands. Thus, in general terms, about one fourth of the species are West Indian and three fourths North American. The remaining eight genera are strictly North American, while three of them, *Helmitherus*, *Helinaia* and *Protonotaria*, are restricted to the eastern half of the United States, as is also *Compsothlypis*, so far as its United States distribution is concerned. *Mniotilta* is also eastern.

The large and widely dispersed Old World family Motacillidæ has only two genera in North America—*Budytes*, barely reaching Alaska, and the nearly cosmopolitan genus *Anthus*.

Cinclus is a mountain type, common to most of the higher mountain ranges of America and Eurasia.

The Troglodytidæ is almost exclusively an American family, represented in Eurasia by the subgenera *Anorthura* and *Elachura*. A few East-Indian genera are sometimes placed here, as *Sphenocichla*, *Pneopyga*, etc., but I think erroneously. The metropolis of the true Wrens is tropical America, where are found more than nine tenths of all the species of the group. The genera *Cistothorus*, *Thryothorus*, and *Campylorhynchus* extend into the warmer parts of the United States. *Salpinctes* and *Catherpes* are peculiar forms of the West and Southwest, of probably Mexican origin.

The subfamily Miminæ, of late associated with the Wrens, is exclusively American, and four out of the five North American genera doubtless originated near where they are now found. One of them, *Galeoscoptes*, is essentially eastern and one, *Oroscoptes*, is western. *Mimus* is tropical, with a single outlying species in North America.

Of the Paridæ, *Sitta* and *Parus* are found throughout the greater part of the northern hemisphere; *Chamæa*, *Psaltriparus*, and *Auriparus* are mainly limited to the northern border of Mexico and the adjoining tier of States to the northward, a

single species of *Psaltriparus* extending southward to the higher mountains of Guatemala, and another northward along the Pacific coast to Washington.

Certhia and *Regulus* belong to the northern hemisphere, ranging over its northern half; *Polioptila* is tropical American, with outlying species extending across the warm temperate.

The cosmopolitan family Turdidæ is represented by three genera—*Merula*, *Turdus* and *Saxicola*—of wide dispersion, and by two—*Hesperocichla* and *Sialia*—which may be considered as autocthonous; the sixth genus, *Myiadestes*, is tropical American, with a single species in the western United States.

In concluding our review of the land birds, the results may be summarized as follows: Total number of genera, 181; of these 55, or 30 per cent., are circumboreal or otherwise wide-ranging Old World forms; 126 genera, or 70 per cent., are American, of which 35, or 28 per cent., are essentially tropical, leaving 91 genera, or about 50 per cent., as distinctively North American.

Separating the Land Birds into the two categories of Passerine and non-Passerine, we find that of the 75 non-Passerine genera, 36 per cent. are wide ranging Old World forms, leaving 64 per cent. as American, of which latter 40 per cent. are tropical American, leaving 30 per cent. of the whole as strictly North American. Of the 106 genera of Passeres, only 25 per cent. are circumboreal or otherwise widely distributed in the Old World, leaving 75 per cent. as American, of which four fifths are strictly North American, or 60 per cent. of the Passerine genera.

The total number of genera represented in North America (as geographically restricted in the A. O. U. Check-List) of which account is here taken, is 274; of these 129, or 44 per cent., are either circumboreal or widely dispersed over the Old World, leaving 145, or 56 per cent., as American. Of the latter 102 genera, or about 40 per cent of the whole, are distinctively North American, and 43 genera, or about 12 per cent. of the whole, may be classed as tropical American.

Of the distinctively North American genera 57 per cent. have a general distribution over the continent, while of the remaining 43 per cent., 17 per cent. are eastern and 26 per cent. are western.

In order to bring still more closely into relief the extent and manner of the relationship of the North American avifauna to

that of the rest of the world, we will divide the non-tropical part of the continent into three belts, namely: (1) An Arctic, including that part of the continent and its adjacent islands north of about the limit of forest vegetation. (2) The Cold Temperate, limited on the north by the Arctic, and on the south by what is commonly recognized as the Canadian Fauna (see Pl. III). Its southern border thus coincides in a general way with the northern limit of the successful cultivation of the staple grains and fruits of the temperate zone. (3) The Warm Temperate, extending from the southern border of the Cold Temperate to about the edge of the palm belt, or to the hot lowlands of Mexico.

The Arctic belt is inhabited during the breeding season by about 65 genera of birds, of which only 5 are exclusively American; the remaining 60 have either a general circumarctic distribution or occur in Eastern Siberia or on the Arctic coast of Europe as well as in North America. None of the 5 American genera is strictly Arctic; they merely extend into the Arctic from the Cold Temperate, while quite a proportion of the circumpolar genera is strictly Arctic in their breeding range.

In the Cold Temperate belt 120 genera are represented, of which 98 are circumpolar and 22 American. Of these 46, or nearly half of the circumpolar genera, range also into the Warm Temperate belt, as do also 14 of the strictly American genera.

In the Warm Temperate belt 95 genera occur which do not range into the Cold Temperate, of which only 12 are Old World, 83 being exclusively American. In addition 60 genera are common to both the Cold Temperate and Warm Temperate, of which 46 are Old World and 14 American. This gives a total of 155 genera in the Warm Temperate, of which 58 are Old World and 97 exclusively American. Besides these, 50 essentially tropical genera reach or extend somewhat into the Warm Temperate, of which 43 are American and 7 tropicopolitan, increasing the total number of genera occurring in the Warm Temperate to about 205.

These statistics illustrate a number of important points: (1) the rapid increase of bird life in North America from the Arctic regions southward, notwithstanding the fact that the continent steadily and greatly decreases in breadth from the north southward, the number of genera in the Arctic belt being 65, in the

Cold Temperate 120, and in the Warm Temperate 205. (2) The decrease of Old World forms from the north southward, in the Arctic belt 91 per cent. of the genera being circumpolar, 82 per cent. in the Cold Temperate, and 37 to 23 per cent. in the Warm Temperate, according to whether the northern or the southern edge of the belt be considered. (3) As the distinctively American genera increase in passing southward, they became more or less differentiated into eastern and western types. Taking land birds alone, to the exclusion of pelagic and strictly maritime, the number of peculiarly eastern genera increases from two or three in the Cold Temperate to 17 in the Warm Temperate, and in the western from three or four in the Cold Temperate to 26 in the Warm Temperate, exclusive in each case of intrusive, essentially tropical forms which if taken into account would still further differentiate the two regions. Besides, as is well known, many genera which range across the continent are represented by different species on the two sides, while most of the continental species are differentiated into eastern and western subspecies, and frequently into a considerable number of local races.

We may now inquire, Whence was derived the present avifauna of North America? It is evident from the facts already presented that it is made up of four prominent elements. The first consists of types common to a large part of the northern hemisphere, which more and more prevail as we proceed from the south northward, till in subarctic and arctic America we meet with little else. The second consists of a rather strong infusion at the southward of types of almost universal distribution over the warmer temperate and intertropical latitudes. Third, a very prominent tropical American element, developed to the maximum just along our southern border and fading out gradually to the northward, little being left of it after we enter the Cold Temperate. Fourth, a very conspicuous autocthonous element, reaching its maximum in the Warm Temperate, and continuing prominent far into the Cold Temperate. This is made up partly of strongly modified Old World types, but mainly of peculiar genera, or at least peculiar species, derived obviously from tropical American stock, which entered our borders partly by way of the West Indies, but mainly by way of Central America and Mexico.

A large part of the distinctively American element in the North American avifauna seems almost obviously of tropical American origin; for example our Vultures, several genera of our Hawks and Owls, our Cuckoos, most of our Woodpeckers, our Nighthawks, Whippoorwills, Swifts, and all of our Hummingbirds; all of our Flycatchers, Orioles and Blackbirds, and our Vireos and Tanagers; many of our Sparrows and Grosbeaks; all of our Gnatcatchers, and the Mockingbirds, some of our Wrens, and a few of our more southern genera of Warblers, as the Yellowthroats and Redstarts.

It seems probable that another portion originated in Mexico, mainly on the great Mexican Plateau, as the Quails, the Turkeys, and some of our Pigeons; a number of our Woodpeckers; the greater part of our Jays, the Pipilos, the various species of *Peucæa*, *Amphispiza* and *Passerina;* the Titmice of the genera *Psaltriparus*, *Auriparus*, and *Chamæa;* our Wrens of the genera *Catherpes* and *Salpinctes;* the Solitaire, most of the Thrashers, and the Bluebirds.

Doubtless we may properly recognize as autochthonous or indigenous a half dozen genera of Sandpipers, our Prairie, Sharp-tailed and Sage Grouse, our Woodpeckers of the genera *Ceophlœus*, *Xenopicus* and *Sphyrapicus;* the Jays of the genera *Cyanocephalus* and *Cyanocitta* and probably *Aphelocoma;* the genera *Scolecophagus*, *Xanthocephalus*, and *Dolichonyx* among the Icteridæ, and among our Sparrows such genera and subgenera as *Passerella*, *Passerculus*, *Ammodramus*, *Spizella*, *Zonotrichia*, *Melospiza*, *Poocætes*, *Spiza*, and *Calamospiza;* of the Warblers the genera *Mniotilta*, *Protonotaria*, *Helinaia*, *Helmitherus*, *Helminthophila*, *Sylvania*, and *Seiurus*, and many of the species of *Dendroica;* also *Galeoscoptes*, *Oroscoptes*, *Hesperocichla*, and *Hylocichla*.

As modifications of Old World or circumpolar stock may be mentioned *Camptolaimus*, *Lophodytes*, and *Chen* among Ducks and Geese, and *Picicorvus*, *Rhynchophanes*, *Hesperiphona*, and *Leucosticte* among Passeres, with of course the hundred or more species and subspecies which belong to circumpolar genera.

Probably three fourths of the distinctively North American genera and species have reached their present habitats by way of Mexico, and perhaps one fourth or less by way of the West Indies. Many of the local genera and species, as those restricted

respectively to the eastern or western sides of the continent, have originated in some part of their present habitats, at a somewhat remote period, but most of them doubtless since the retreat of the glacial ice. In earlier times the barrier separating the ranges of species occupying respectively the eastern and western parts of the United States must have been much stronger than it is at present; and it will be less doubtless a few decades hence than it is now. There is good evidence that the eastern species are gradually extending their range westward, as I have already pointed out in the case of *Colaptes auratus*, and that western species are, in some cases at least, extending their range eastward. This is doubtless in great part due to, and is certainly aided by, the westward extension of agriculture, which is so rapidly transforming regions not long ago thought to be almost irreclaimable deserts. Irrigation and tree-planting, and the general pursuits of agriculture, cannot fail to extend westward the ranges of many eastern species, as the Bobwhite and various Sparrows, and probably of many of the smaller Passeres.

PART II.—THE FAUNAL SUBDIVISIONS OF NORTH AMERICA, CONSIDERED WITH REFERENCE TO THEIR RELATIONSHIPS, CLASSIFICATION AND NOMENCLATURE.[1]

1.—*Faunal Areas.*

In zoögeography it is necessary to recognize faunal areas varying in grade and importance, just as in zoölogy it is necessary to divide animals into groups differing in rank, as *classes*, *orders*, *families*, *genera* and *species*. The terms employed in zoögeography, however, have not been used with the same precision as the practically corresponding terms in zoölogy. Identical designations have sometimes been used in

[1] The classification and nomenclature here adopted is the same as in my recent paper on 'The Geographical Distribution of North American Mammals' (Bull. Am. Mus. Nat. Hist., Vol. IV, pp. 199-243, Dec. 1892). Also much of the matter, as regards the generalities of the subject, is the same in substance and often in phraseology. The accompanying maps are also reproduced, by permission, from the paper just cited. As that paper is not likely to be readily accessible to the majority of the readers of 'The Auk,' it is hoped that the reproduction of some matter previously published in another connection may not be considered reprehensible.

widely different senses, in accordance with the individual preferences of different writers. The terms *realm*, *region*, *kingdom*, *province*, *district*, and *fauna* have sometimes been applied by different writers to nearly the same geographical area, and each of them to divisions considered as of primary rank, while most of them have also been used for regions of secondary or still lower grade. In many cases they have been used merely in a quasi-technical sense, and there is hence difficulty in determining their claims to recognition by any rule of priority, or by frequency of use in any particular sense; so we are forced to choose mainly on grounds of appropriateness and convenience, the main thing being to secure uniformity of application. In view of this unfortunate state of affairs I attempted, in a paper on the geographical distribution of North American birds, published in 1871,[1] to devise a system of terms that should be not only appropriate, but in as close conformity as possible with previous usage. Finding that *realm* had been used by Agassiz and others for regions of the first rank, and that *region* and *province* had generally been employed for areas of secondary or lower rank, I proposed a scheme of nomenclature, which to some extent has been followed by others, but of course not fully or rigidly, since little attention has been paid to exact terminology in geographical biology. The scheme then proposed is as follows:—

For divisions of the first rank, *Realm*.
" " " second rank, *Region*.
" " " third " *Province*.
" " " fourth " *Subprovince or District*.
" " " fifth " *Fauna*.

Their grade and order of sequence may be indicated by a comparison with the leading groups in zoölogy; thus *realm* would correspond in rank with *class; region* with *order; province* with *family; district* with *genus; fauna* (or *flora*, as the case may be) with *species*. It sometimes becomes convenient to recognize other divisions intermediate to these—as in zoölogy we have suborder, subfamily, subgenus, and sub-

[1] Bull. Mus. Comp. Zoöl., II, No. 3, April, 1871.

species, so we may have in zoögeography *subregions*, *subprovinces*, and even *subfaunæ*. In addition to and independent of these divisions we may also recognize *zones*. To illustrate by an example, temperate North America forms a *region* of a *realm* and includes two *subregions*, one of which is divisible into *provinces* and *subprovinces*, and some of these latter into *districts*, while each may contain several *faunæ*. It also proves desirable to subdivide the continent into a number of transcontinental belts or *zones*, which in a way coincide with the climatic zones of the physiographer.

The term *fauna* is unfortunately in current use both in a general sense and also in a restricted, taxonomic sense. In the first case it is employed to designate the animal life of a given area, geographical or political, varying in extent from a township to a continent, from a transient pool to a lake or an ocean, or in geology from a definite stratigraphic horizon to a geologic age, as the qualifying words may chance to indicate; in the second case it is a definite taxonomic term for the ultimate subdivisions of a realm, as is the term *species* for the ultimate divisions of a *class*. The term *flora* has also the same double use; and it would perhaps be futile to attempt to displace either by some specially coined substitute, to take the place of these terms when used in a specific sense for an ultimate faunal or floral area. Such an attempt, however, is perhaps unnecessary, since the qualifying prefix will rarely, if ever, leave one in doubt as to whether the term is used in a general or in a taxonomic sense.

Realms are sometimes characterized by the presence of certain orders, and usually by the presence of certain families which give to them a particular impress, and by the absence of others which in a similar way characterize other realms. Regions are usually characterized by the prevalence over them of certain genera, or even by entire families; provinces by the prevalence of particular genera or by the presence or absence of prominent species. Faunæ, on the other hand, are seldom characterized by having restricted to them any particular genera or species, but by the combination or overlapping of a number of genera and species not found elsewhere associated,—in other words, by a peculiar commingling of a considerable number of genera and species.

The transition between faunæ, between provinces, or between adjoining divisions of any grade, is rarely abrupt; it is impossible to give them absolute boundaries; yet they may be limited, in a general way, with considerable definiteness. They depend upon climatic conditions, which are in a measure determined or modified by features of topography; in other words, they are determined by the same conditions that govern the distribution of species. Hence they can seldom be bounded by geographical meridians, or by parallels of latitude, or by political boundaries; they do, however, closely coincide with certain isothermal lines, which are generally those of the season of reproduction. As temperature is influenced by altitude as well as by latitude, elevated tablelands and mountain ranges deflect the isotherms, in the northern hemisphere, far to the southward of their position over the contiguous low country, and furnish congenial homes for northern forms of animals and plants under comparatively low latitudes. Thus in the Appalachian Highlands we find northern types far to the southward of their range in the low country on either side; and the same is more strikingly apparent in the case of the Rocky Mountains, where northern types extend far down into Mexico, and in the Cascade and Sierra Nevada chain where northern types extend to southern California; isolated patches of northern life also occur on the summits of detached peaks and outlying ranges throughout the Plateau and Great Basin regions of the West. Northern and southern forms of life thus interdigitate according to elevation of the land.

While the life of the middle temperate latitudes, at ordinary levels, is so different from that of the high north on the one hand, and from that of the tropics on the other, the change is effected by a very gradual transition between the two extremes. If we suppose the life of either of the northern continents to be represented by a cube, and this cube to be composed of two blunt-edged wedges, and the two wedges so placed that one thin edge and one thick edge shall form respectively the base and the top of the cube, the two wedges would represent the fading out of the northern life southward and of the southern life northward; except that in nature the two elements are diffused through the mass instead of being segregated as in our supposed cube.

Furthermore, this northern life is largely circumpolar, so that

as we proceed northward, as in North America for example, the genera become in increasing ratio more and more those of wide distribution, till in the extreme north we meet with few that are not circumpolar. How gradually and completely this transition is made has already been shown (*antea*, p. 114), 47 per cent of the non-pelagic birds of North America occurring in corresponding latitudes in the Old World. Extra-tropical North America has, in fact, so much in common with extra-tropical Eurasia, that the two areas constitute merely two regions of a single realm.

To indicate my views in respect to the faunal relations of North America to the world at large, I will recapitulate briefly what I consider may be properly regarded as the primary life areas of the earth's surface, namely:—

(1) An *Arctic Realm*, occupying the region northward from about the limit of forest vegetation, or from about the isotherm of 32° F. It is characterized by its paucity of life and its homogeneousness, nearly all its forms of both animal and vegetable life ranging throughout its whole extent.

(2) A *North Temperate Realm*, extending from the northern limit of forest vegetation to the northern border of the palm belt, or between the annual isotherms of 32° and 70° F.

(3) An *American Tropical Realm*, consisting, as the name implies, of tropical America.

(4) An *Indo-African Realm*, consisting of Africa (except the northern border), and tropical Asia and its outlying islands.

(5) A *South American Temperate Realm*, embracing extra-tropical South America.

(6) An *Australian Realm*, including not only Australia, but New Guinea, New Zealand, and the various groups of islands to the northward and eastward.

(7) A *Lemurian Realm*, consisting of Madagascar.

An eighth or *Antarctic Realm* is also sometimes recognized, as the Antarctic counterpart of the Arctic realm, though perhaps less well characterized, its fauna consisting almost exclusively of maritime and pelagic species.

The North Temperate Realm is divisible into two regions, (1) a *North American Region*, consisting of temperate North America, and (2) a *Eurasiatic Region*, consisting of temperate Eurasia.

Before proceeding to consider the North American Region and its faunal subdivisions, a few words may be devoted to the *American Arctic*, which is here set off from the rest of North America as a part of the Arctic Realm. If North America were entirely isolated from the rest of the world, it would be quite proper to treat the American Arctic as merely a subdivision of the North American Region; but in view of the fact that it is in reality a part of a homogeneous hyperborean fauna of circumpolar distribution, it seems more in accordance with general facts to consider it as forming part of an Arctic Realm. The propriety of this seems especially emphasized when we consider that (to quote the words of Dr. Merriam) "the animals and plants inhabiting the Arctic regions are usually specifically identical throughout Arctic America, Greenland, and the polar parts of Eurasia and outlying islands," "the types inhabiting the Arctic Zone being few in number and uniform in character throughout their distribution."[1] The fauna of this Arctic Zone is thus no more American than it is Eurasiatic, and differs far more from that of the adjoining region to the southward, both in North America and Eurasia, than does the American Arctic from the Eurasian Arctic. The Arctic Realm possesses only a small number of peculiar types in proportion to its area or in comparison with the other realms, yet its ratio of peculiar types, in comparison with its meagre fauna, is by no means low. It seems an eminently natural division from the fact that its southern boundary marks the termination of forest vegetation, with which necessarily stop all the mammals, birds and insects which depend upon forests for food, shelter and a congenial home. Of the 65 genera of birds occurring in the American Arctic 60 are, as already shown, circumpolar, and 5 are American water birds that reach it for a short stay during the breeding season.

The American Arctic may be divided into two areas which may take the rank of faunæ, namely: (1) *Barren Ground*, (2) *Alaskan-Arctic*. The last has been characterized by Mr. E. W. Nelson,[2] and the first by me in a recently published paper on 'The Distribution of North American Mammals' (l. c. p. 220).

[1] Proc. Biol. Soc. Wash., VII, 1892, pp. 39, 40.

[2] Rep. Nat. Hist. Coll. in Alaska, 1887, pp. 26-32.

The exact limits of the breeding ranges of our arctic and subarctic birds is still very imperfectly known. Of the following list of 80 species and subspecies, a few doubtless range in the breeding season somewhat below the southern boundary of the Arctic, but for the most part they may be considered as distinctively characteristic of the Arctic fauna. A large proportion of them are either strictly circumpolar, or are represented in Eurasia by closely allied species or subspecies.

Distinctively Arctic.

(Those marked with a * are apparently confined mainly or wholly to the Eastern Arctic or Barren Ground Fauna; those marked with a † are Western or Alaskan Arctic; those with no sign prefixed are of general distribution, by far the greater part being circumpolar.)

† Urinator adamsi
Urinator arcticus
† Urinator pacificus
Fratercula arctica glacialis
Cepphus mandtii
Stercorarius pomarinus
Stercorarius parasiticus
Stercorarius longicaudus
Gavia alba
† Rissa tridactyla pollicaris
† Rissa brevirostris
* Larus glaucus
† Larus barrovianus
Larus leucopterus
† Larus glaucescens
* Larus kumlieni
† Larus nelsoni
* Larus marinus
† Larus schistisagus
Rhodostethia rosea
Xema sabinii
† Sterna aleutica
Fulmarus glacialis
† Fulmarus g. glupischa
† Phalacrocorax pelagicus
† Phalacrocorax urile
† ? Eniconetta stelleri
† Arctonetta fischeri
* Somateria borealis
† Somateria v-nigra
Somateria spectabilis
Oidemia americana
Chen hyperborea
Chen rossii
Anser albifrons gambeli
† Philacte canagica
Olor columbianus
Crymophilus fulicarius
Phalaropus lobatus
Tringa canutus
* Tringa maritima
† Tringa couesi
† Tringa ptilocnemis
† Tringa acuminata
Tringa maculata
* Tringa fuscicollis
† Tringa bairdii
Tringa alpina pacifica
* Ereunetes pusillus
† Ereunetes occidentalis
Calidris arenaria
Limosa hæmastica
† Limosa lapponica baueri
† Heteractitis incanus
Numenius hudsonicus
Numenius borealis
Charadrius squatarola
Charadrius dominicus

† Charadrius d. fulvus
Ægialitis semipalmata
* Ægialitis hiaticula
Arenaria interpres
Arenaria melanocephalus
Lagopus lagopus
Lagopus rupestris
* Lagopus r. reinhardti
Falco islandus
Falco rusticolus gyrfalco
* Falco rusticolus obsoletus
Otocoris alpestris
Acanthis hornemanni exilipes
* Acanthis linaria rostrata
Acanthis linaria holbœlli
Plectrophenax nivalis
† Plectrophenax hyperboreus
Calcarius lapponicus
Calcarius pictus
Anthus pensilvanicus
Saxicola œnanthe

The following are arctic faunally, if not geographically, breeding mostly above timberline in the Rocky Mountains:—

Lagopus leucurus
Leucosticte tephrocotis
Leucosticte atrata
Leucosticte australis

Many other species, more properly Cold Temperate than Arctic, range into the Arctic so that the above list is by no means a complete enumeration of the American Arctic avifauna.

The North American Region (see Pl. III) consists of two *Subregions*, namely, (1) a *Cold Temperate Subregion* and (2) a *Warm Temperate Subregion*. The Cold Temperate Subregion extends across the continent from about the mean latitude of 43° northward to the limit of forests, with also a narrow prolongation southward along the Appalachian Highlands as far as northern Georgia; another in the interior along the main chain of the Rocky Mountains and its principal outliers south into Mexico; and a third along the Cascade and Sierra Nevada ranges. Its southern border also sweeps to the northward so as to exclude the great Saskatchewan Plains. In other words, the Cold Temperate coincides exactly with Dr. Merriam's 'Boreal Province' as laid down on his 'Provisional Biological Map of North America'.[1] As compared with the Arctic, it has 120 genera instead of 65, of which about 70 per cent. are circumpolar, and 30 per cent. American, showing the close connection of the life of the whole northern half of the northern hemisphere.

The following list of 213 species and subspecies includes only such as may be properly considered as distinctively characteristic of the Cold Temperate Subregion, as contrasted on the one hand

[1] N. Am. Fauna, No. 3, 1891, map 5.

with the American Arctic, and on the other with the Warm Temperate Subregion. Not all of them, however, are strictly limited to the Cold Temperate, a few ranging into the southern border of the Arctic, and a few others extending southward into the northern edge of the Warm Temperate; but their ranges, generally speaking, may be regarded as limited to the Cold Temperate. In scanning the list it should be borne in mind that this subregion extends very far southward along the principal mountain ranges of the continent.

Distinctively Cold Temperate.

Colymbus auritus
Colymbus holbœlli
Urinator imber
Urinator lumme
Fratercula arctica
Cyclorrhynchus psittaculus
Simorhynchus cristatellus
Simorhynchus pygmæus
Simorhynchus pusillus
Synthliborhamphus antiquus
Cepphus grylle
Alca torda
Plautus impennis
Larus argentatus smithsonianus
Larus delawarensis
Larus vegæ
Larus brachyrhynchus
Larus franklini
Larus philadelphia
Sterna paradisæa
Puffinus tenuirostris
Oceanodroma furcata
Oceanodroma leucorrhoa
Sula bassana
Phalacrocorax carbo
Phalacrocorax dilophus
Phalacrocorax d. cincinnatus
Phalacrocorax pelagicus robustus
Merganser americanus
Merganser serrator
Anas carolinensis
Anas discors
Dafila acuta
Aythya americana
Aythya vallisneria
Aythya marila nearctica
Aythya affinis
Aythya collaris
Glaucionetta clangula americana
Glaucionetta islandica
Charitonetta albeola
Histrionicus histrionicus
Camptolaimus labradorius
Oidemia deglandi
Oidemia perspicillata
Branta canadensis
Branta c. occidentalis
Branta bernicla
Olor buccinator
Porzana carolina
Porzana noveboracensis
Gallinago delicata
Macrorhamphus griseus
Macrorhamphus scolopaceus
Micropalama himantopus
Tringa minutilla
Limosa fedoa
Totanus melanoleucus
Totanus flavipes
Totanus solitarius
Totanus s. cinnamomeus
Tryngites subruficollis
Dendragapus obscurus
Dendragapus obscurus fuliginosus
Dendragapus obscurus richardsoni
Dendragapus canadensis

Dendragapus franklini
Bonasa umbellus togata
Bonasa u. umbelloides
Bonasa u. sabini
Lagopus welchi
Lagopus lagopus alleni
Lagopus rupestris nelsoni
Lagopus r. atkhensis
Pediocætes phasianellus
Accipiter atricapillus
Accipiter a. striatulus
Archibuteo sancti-johannis
Falco columbarius
Falco richardsoni
Scotiaptex cinerea
Bubo virginianus arcticus
Bubo virginianus saturatus
Nyctala tengmalmi richardsoni
Nyctea nyctea
Surnia ulula caparoch
Dryobates villosus leucomelas
Dryobates v. hyloscopus
Dryobates pubescens gairdneri
Dryobates pubescens oreœcus
Picoides arcticus
Picoides americanus
Picoides a. dorsalis
Picoides a. alascensis
Sphyrapicus varius
Sphyrapicus v. nuchalis
Sphyrapicus thyroideus
Contopus borealis
Empidonax flaviventris
Empidonax difficilis
Empidonax pusillus
Empidonax minimus
Empidonax hammondi
Otocoris alpestris leucolæma
Pica pica hudsonius
Cyanocitta stelleri
Cyanocitta s. frontalis
Cyanocitta s. macrolopha
Cyanocitta s. annectens
Perisoreus canadensis
Perisoreus c. capitalis
Perisoreus c. fumifrons
Perisoreus c. nigricapillus
Perisoreus obscurus
Picicorvus columbianus
Cyanocephalus cyanocephalus
Corvus corax principalis
Scolecophagus carolinus
Coccothraustes vespertinus
Coccothraustes v. montanus
Pinicola enucleator
Leucosticte griseonucha
Carpodacus purpureus
Carpodacus p. californicus
Carpodacus cassini
Loxia leucoptera
Spinus pinus
Ammodramus princeps
Ammodramus sandwichensis
Ammodramus s. savanna
Ammodramus s. alaudinus
Zonotrichia querula
Zonotrichia leucophrys
Zonotrichia l. intermedia
Zonotrichia l. gambeli
Zonotrichia coronata
Zonotrichia albicollis
Spizella monticola
Spizella m. ochracea
Junco aikeni
Junco hyemalis
Junco h. oregonus
Junco h. shufeldti
Junco h. carolinensis
Junco h. thurberi
Junco annectens
Junco cinereus dorsalis
Junco cinereus palliatus
Melospiza cinerea
Melospiza lincolni
Passerella iliaca
Passerella iliaca unalaschcensis
Passerella iliaca megarhyncha
Passerella iliaca schistacea
Tachycineta bicolor
Tachycineta thalassina
Ampelis garrulus
Lanius borealis

Vireo philadelphicus
Helminthophila ruficapilla
Helminthophila r. gutturalis
Helminthophila celata
Helminthophila c. lutescens
Helminthophila peregrina
Dendroica tigrina
Dendroica cærulescens
Dendroica coronata
Dendroica auduboni
Dendroica maculosa
Dendroica castanea
Dendroica striata
Dendroica blackburniæ
Dendroica virens
Dendroica townsendi
Dendroica palmarum
Dendroica p. hypochrysea
Seiurus noveboracensis
Seiurus n. notabilis
Geothlypis agilis
Geothlypis philadelphia
Geothlypis macgillivrayi
Sylvania pusilla
Sylvania p. pileolata
Sylvania canadensis
Cinclus mexicanus
Troglodytes hiemalis
Troglodytes h. pacificus
Troglodytes alascensis
Certhia familiaris americana
Certhia familiaris montana
Certhia familiaris occidentalis
Sitta canadensis
Sitta pygmæa
Parus atricapillus
Parus a. septentrionalis
Parus a. occidentalis
Parus gambeli
Parus cinctus obtectus
Parus hudsonicus
Parus h. stoneyi
Parus rufescens
Regulus satrapa
Regulus s. olivaceus
Regulus calendula
Turdus aliciæ
Turdus aliciæ bicknelli
Turdus ustulatus
Turdus u. swainsonii
Turdus aonalaschkæ
Turdus a. auduboni
Turdus a. pallasii
Hesperocichla nævia
Sialia arctica

Of the above list of 213 species and subspecies, about 20 are maritime, about 60 range across the continent, and about 130 have a more limited range. Of these a small number is limited to the immediate vicinity of the Northwest Coast, a few to the Upper Missouri region, and a large number to the Rocky Mountain plateau and the various mountain ranges of the western half of the continent.

The Cold Temperate Subregion has been divided into four *faunæ*, as follows: (1) *Hudsonian*, (2) *Canadian*, (3) *Aleutian*, (4) *Sitkan*. The first two have been long recognized, and their boundaries are well known. They were first mapped by Dr. Merriam[1] in 1890, and more recently by the

[1] North American Fauna, No. 3, map 5.

present writer,[1] on practically the same lines. The last two were first defined by Mr. E. W. Nelson[2] as respectively the 'Sitkan District' and the 'Aleutian District,' and re-defined and mapped in my recent paper on the 'Geographical Distribution of North American Mammals.'[3] As noted later in the present paper (p. 139), there remain to be defined, when our knowledge of the subject becomes sufficiently detailed, a series of local mountain faunæ in the Rocky Mountains and other principal mountain chains in the West.

The *Warm Temperate Subregion* occupies middle North America, extending from the southern boundary of the Cold Temperate Subregion, as defined above, to the northern edge of the American Tropical Realm (see Pl. III). It is thus geographically the same as Dr. Merriam's 'Sonoran Province.' It includes the greater part of the United States, Lower California, and the Mexican tableland. It is cut into along the principal mountain systems by the southern prolongations of the Cold Temperate Subregion, and also extends northward over the Saskatchewan Plains. The extreme southern parts of the peninsulas of Florida and Lower California, however, are excluded, as also the lower coast region of Texas, these excluded districts, though of comparatively small extent, belonging to the Tropical Realm.

The Warm Temperate Subregion contrasts strongly with the Cold Temperate in respect to its topographic and climatic features, as well as in its faunal aspects. Aside from the very marked difference of temperature between the two, the Cold Temperate is a homogeneous region, covered almost continuously with principally coniferous forests; and aside from its southern extension along the mountain ranges, presents little diversity in topography. The Warm Temperate, on the other hand, is highly diversified topographically, and consequently in climate, especially in respect to rainfall, which of course greatly modifies the distribution of forests, and of plants in general, which in turn exerts a marked influence upon the distribution of animal life. We have hence conditions favorable for the development of

[1] Bull. Am. Mus. Nat. Hist., IV, 1892, pl. viii.
[2] Rep. Nat. Hist. Coll. made in Alaska, 1887, pp. 24–27.
[3] Bull. Am. Mus. Nat. Hist., IV, 1892, pp. 223, 224, pl. viii.

locally restricted types, including families as well as genera and species, to say nothing of merely geographical races or subspecies. Consequently it is divisible into a larger number of faunal areas, varying to a much greater extent as regards their relative taxonomic rank, and much more strongly contrasted in respect to their faunal characteristics.

The Warm Temperate Subregion may be considered as primarily divisible along a nearly north and south line into two *Provinces*, namely (1) an eastern or *Humid Province* and (2) a western or *Arid Province*. The Humid Province extends from the Atlantic coast westward to about the 100th meridian, or to the eastern border of the Great Plains, exclusive, of course, of the Appalachian Highlands; the Arid Province extends thence westward to the Pacific coast, exclusive, of course, of the southward extensions of the Cold Temperate along the mountain systems. These regions thus correspond respectively with Dr. Merriam's 'Humid Sonoran' and his 'Arid Sonoran,' as he originally defined them. The Humid Province, as the name implies, has a rather moist climate and is (or was a century ago) in most parts heavily forested; the Arid Province is, on the other hand, a region of open plains and deserts, with, in general, an excessively arid climate.

These two provinces thus coincide with the two strongly marked regions of the middle portion of North America in respect to climate as modified by rainfall. The line of separation is thus meridional instead of transcontinental as are the faunal boundaries determined by temperature. In this case temperature, as a controling influence in the distribution of animals and plants, is subordinated to the usually less powerful agent, humidity.

The transition between the Humid and Arid Provinces is nowhere abrupt; they gradually merge into each other everywhere along their line of junction, as the prairies of the Mississippi Valley gradually become more arid and take on the characteristic aspect of the plains. There is thus here the usual 'transition' belt occurring between contiguous faunal areas. It is, however, rather broader than between regions where temperature is primarily the limiting influence, as in the case of boundaries trending in a nearly east and west direction, the transition being first from a forested region to one of fertile prairies, and thence to arid

plains and deserts. The dividing line may be considered as coincident with the isohyetal curve marking an annual rainfall of 20 inches or less, as shown on the rainfall charts of the United States, — in other words, as already stated, near the 100th meridian.

The contrasting climatic conditions of these two regions are due to peculiar physiographic and geographic conditions which extend back to a comparatively remote period — so remote as to have given time for the development of many generic forms limited almost entirely to one or the other of these two regions. Thus, in respect to birds, we have 17 genera in the Humid Province which do not range to any great extent into the Arid Province, and 28 genera in the Arid Province which are not found to any extent in the Humid. The distinctively eastern or Humid Province genera are:—

Philohela	Ictinia	Protonotaria
Bartramia	Dolichonyx	Helinaia
Colinus	Quiscalus	Helmitherus
Tympanuchus	Ammodramus[1]	Compsothlypis
Catharista	Spiza	Galeoscoptes
Elanoides	Mniotilta	

A few of these genera range into the eastern border of the Plains, and sometimes, as in the case of *Galeoscoptes*, occur locally westward to the Pacific coast. They are nevertheless to be regarded as distinctively characteristic of the eastern side of the continent. *Colinus* is more difficult to locate, as southern forms of the genus occur in the Sonoran Subprovince of the Arid, while its northern form, *C. virginianus*, is distinctively an eastern form characteristic of the Humid Province.

On the other hand, the following genera may in like manner be considered as distinctively characteristic of the Arid Province, although some of them range northward into the Cold Temperate:—

Æchmophorus	Pediocætes	Micropallas
Oreortyx	Centrocercus	Geococcyx
Callipepla	Pseudogryphus	Xenopicus
Cyrtonyx	Glaucidium	Phalænoptilus

[1] Subgenus.

Cypseloides	Amphispiza	Chamæa
Aëronautes	Calamospiza	Psaltriparus
Selasphorus	Phainopepla	Auriparus
Xanthocephalus	Salpinctes	Myiadestes
Calcarius	Catherpes	
Rhyncophanes	Oroscoptes	

Were we to include in this connection some 38 additional tropical genera which range only a short distance into the Warm Temperate, as here defined, we should have to add 7 genera to the eastern list and about 30 to the western list. In other words, out of a total of about 150 genera distinctive of the Warm Temperate,[1] about 65, or 43 per cent., have a transcontinental distribution, and about 85, or 57 per cent., are either eastern or western.

The higher ratio of peculiar types in the Arid Province as compared with the Humid Province is obviously due to geographic conditions, the Arid Province adjoining at the southward a broad tropical land area, while the southern boundary of the Humid Province is formed by the Gulf of Mexico. A large proportion of the genera peculiar to either the Humid or Arid Provinces range across the whole north and south breadth of the Warm Temperate Subregion.

The northern half of the Warm Temperate, however, also differs faunally quite markedly from the southern half, in consequence of the extension southward of a few northern genera over most of its northern half, and the extension northward of many tropical genera over a portion of its southern half. As regards birds, while a considerable list of species would fall respectively into one or the other of these two categories, the number of genera is small, owing to the fact that if we take them on the basis of their transcontinental range their representation is often very different in the two provinces, as regards both their geographical distribution and the species which represent them. The northern list would include perhaps such genera as *Botaurus* (excluding *Butorides*), *Bonasa*, *Passerculus* (subgenus), and perhaps *Tachycineta* and *Ampelis*, and in the East *Carpodacus* and *Merula;* although most of these are really Cold

[1] Cosmopolitan and other wide-ranging genera are not included in this connection, but only such as are distinctively American.

Temperate rather than Warm Temperate forms. The southern list would include a large number of tropical genera which range into the southern part of the Warm Temperate—such for instance as *Columbigallina*, *Scardafella*, *Urubitinga*, *Asturina*, *Geococcyx*, *Conurus*, *Nyctidromus*, various genera of Hummingbirds, *Milvulus*, *Pyrocephalus*, *Campylorhynchus*, *Catherpes*, etc.; but they are nearly all limited to the Arid division of the Warm Temperate, and thus serve to emphasize the differences distinguishing the Arid from the Humid Province quite as much as a northern and southern division along a transcontinental line. The differentiation of the Warm Temperate into two transcontinental belts—a northern and a southern—is thus due to the increase of tropical forms near the southern border, in accordance with the law of general increase of the forms of life from the north southward.

In respect to species and subspecies, the following lists may serve to indicate the forms characteristic respectively of the Humid and Arid Provinces. As the transition between the two is gradual, with many interdigitations, through the extension of forest or tree-loving species up the partially wooded river valleys into the Plains, the lists are to some degree open to the criticism that many species classified as eastern are not sharply limited at the eastern edge of the Plains, and that a few of the properly Arid Province species range eastward to the prairies east of the Mississippi River, yet in general terms the distribution is as implied in the headings of the two lists. The straggling of Catbirds and Kingbirds to the Great Basin, and even to the Pacific coast, does not weigh heavily against the propriety of including them in the Humid Province list since they are here such characteristic elements of the fauna. The lists, furthermore, are not intended to be complete; to save space subspecies are in many instances omitted; the more tropical forms, and generally also those of local distribution, as well as the maritime water birds, are excluded.

Humid Province.

Ajaja ajaja
Guara alba
Ardea rufescens
Ardea tricolor ruficollis
Ardea cœrulea
Nycticorax violaceus
Rallus elegans
Ionornis martinica

Philohela minor
Symphemia semipalmata
Ægialitis meloda
Colinus virginianus
Tympanuchus cupido
Tympanuchus americanus
Meleagris gallopavo
Columbigallina passerina
Catharista atrata
Elanoides forficatus
Ictinia mississippiensis
Buteo lineatus
Buteo latissimus
Syrnium nebulosum
Megascops asio
Conurus carolinensis
Dryobates villosus
Dryobates borealis
Melanerpes erythrocephalus
Melanerpes carolinus
Antrostomus vociferus
Antrostomus carolinensis
Tyrannus tyrannus
Tyrannus dominicensis
Myiarchus crinitus
Sayornis phœbe
Contopus virens
Empidonax acadicus
Otocoris alpestris praticola
Cyanocitta cristata
Aphelocoma floridana
Corvus ossifragus
Dolichonyx oryzivorus
Molothrus ater
Sturnella magna
Agelaius phœniceus
Quiscalus major
Quiscalus quiscula
Ammodramus savannarum
Chondestes grammacus
Spizella pusilla
Peucæa æstivalis
Melospiza fasciata
Pipilo erythrophthalmus
Cardinalis cardinalis
Guiraca cærulea
Habia ludoviciana
Passerina cyanea
Passerina ciris
Piranga rubra
Piranga erythromelas
Lanius ludovicianus
Vireo flavifrons
Vireo solitarius
Vireo noveboracensis
Protonotaria citrea
Helinaia swainsonii
Helmitherus vermivorus
Helminthophila pinus
Helminthophila chrysoptera
Helminthophila bachmani
Dendroica cærulea
Dendroica pensylvanica
Dendroica dominica
Dendroica kirtlandi
Dendroica vigorsii
Dendroica discolor
Seiurus aurocapillus
Seiurus motacilla
Geothlypis trichas
Geothlypis formosa
Icteria virens
Sylvania mitrata
Galeoscoptes carolinensis
Harporhynchus rufus
Thryothorus ludovicianus
Thryothorus bewickii
Troglodytes aëdon
Cistothorus palustris
Cistothorus stellaris
Sitta carolinensis
Sitta pusilla
Parus bicolor
Parus carolinensis
Polioptila cærulea
Turdus mustelinus
Turdus fuscescens
Sialia sialis

Arid Province.

Anas cyanoptera
Dendrocygna fulva
Dendrocygna autumnalis
Plegadis guarauna
Symphemia s. inornata
Ægialitis meloda circumcincta
Ægialitis nivosa
Ægialitis montana
Callipepla squamata
Callipepla gambeli
Callipepla californica
Oreortyx pictus
Colinus virginianus texensis
Pediocætes phas. columbianus
Pediocætes phas. campestris
Tympanuchus pallidicinctus
Meleagris gallopavo ellioti
Meleagris gallopavo mexicanus
Columba fasciata
Columbigallina p. pallescens
Pseudogryphus californianus
Buteo borealis calurus
Buteo borealis harlani
Buteo lineatus elegans
Archibuteo ferrugineus
Falco mexicanus
Syrnium occidentale
Megascops asio (subsps.)
Megascops flammeolus
Speotyto cunicularia hypogæa
Glaucidium gnoma
Micropallas whitneyi
Geococcyx californianus
Dryobates villosus (subsps.)
Dryobates nuttalli
Dryobates scalaris
Dryobates arizonæ
Xenopicus albolarvatus
Melanerpes torquatus
Melanerpes formicivorus bairdi
Melanerpes uropygialis
Colaptes cafer
Colaptes chrysoides
Phalænoptilus nuttalli
Antrostomus vociferus arizonæ
Chordeiles virginianus henryi
Chordeiles acutipennis texensis
Cypseloides niger
Chætura vauxi
Aëronautes melanoleucus
Trochilus alexandri
Selasphorus rufus
Selasphorus alleni
Selasphorus platycercus
Calypte anna
Tyrannus verticalis
Tyrannus vociferans
Myiarchus mexicanus
Myiarchus cinerascens
Sayornis saya
Sayornis nigricans
Contopus richardsonii
Contopus pertinax
Empidonax wrightii
Empidonax fulvifrons
Otocoris alpestris (subsps.)
Aphelocoma woodhousei
Aphelocoma californica
Aphelocoma sieberi arizonæ
Corvus caurinus
Molothrus ater obscurus
Xanthocephalus xanthocephalus
Sturnella magna neglecta
Agelaius phœniceus sonoriensis
Agelaius gubernator
Agelaius tricolor
Icterus bullocki
Icterus cucullatus (subsp.)
Icterus parisorum
Scolecophagus cyanocephalus
Carpodacus mexicanus frontalis
Spinus psaltria
Calcarius ornatus
Rhyncophanes mccownii
Poocætes gramineus confinis
Ammodramus s. perpallidus
Ammodramus h. occidentalis
Chondestes grammacus strigatus
Spizella pusilla arenacea
Spizella pallida

Spizella breweri
Spizella atrigularis
Amphispiza bilineata
Amphispiza belli
Peucæa cassini
Peucæa carpalis
Peucæa ruficeps
Melospiza fasciata (subsps.)
Pipilo maculatus (subsps.)
Pipilo fuscus
Pipilo aberti
Pipilo chlorurus
Cardinalis cardinalis (subsps.)
Pyrrhuloxia sinuata
Guiraca cærulea eurhyncha
Habia melanocephala
Passerina amœna
Passerina versicolor
Calamospiza melanocorys
Piranga rubra cooperi
Piranga ludoviciana
Phainopepla nitens
Lanius ludovicianus (subsps.)
Vireo solitarius (subsps.)
Vireo atricapillus
Vireo belli
Vireo huttoni
Vireo vicinior
Helminthophila luciæ
Helminthophila virginiæ
Dendroica graciæ
Dendroica chrysoparia
Dendroica nigrescens
Dendroica occidentalis
Geothlypis trichas occidentalis
Icteria virens longicauda
Oroscoptes montanus
Harporhynchus longirostris
Harporhynchus curvirostris
Harporhynchus bendirei
Harporhynchus lecontei
Harporhynchus crissalis
Salpinctes obsoletus
Catherpes mexicanus
Campylorhynchus brunneicapillus
Thryothorus ludovicianus (subsp.)
Thryothorus bewickii (subsps.)
Troglodytes aëdon (subsps.)
Cistothorus palustris paludicola
Sitta carolinensis aculeata
Sitta pygmæa
Parus bicolor texensis
Parus inornatus
Parus atricristatus
Parus wollweberi
Parus carolinensis agilis
Chamæa fasciata
Psaltriparus lloydi
Psaltriparus minimus
Psaltriparus plumbeus
Psaltriparus santaritæ
Auriparus flaviceps
Polioptila cærulea obscura
Polioptila plumbea
Polioptila californica
Myiadestes townsendi
Turdus fuscescens (subsp.)
Sialia mexicana

A careful tabulation of the thousand or more species and subspecies of North American birds shows that about 400 occur in the Warm Temperate Subregion that do not extend much to the northward of its northern border, and which may be hence termed distinctively Warm Temperate species. This excludes about 75 essentially tropical species and subspecies which range into the southern border of the United States, and also about 86 wide-ranging species whose habitats either broadly overlap both subregions or have even a much greater distribution and are thus not properly distinctive of either the Cold Temperate or the Warm Temperate.

Of the 400 essentially Warm Temperate forms only about 6 per cent. have a transcontinental range; about 25 per cent. may be considered as having a more or less general dispersion over the Humid Province, to which they are restricted, and about 44 per cent. range more or less at large over the Arid Province, to which they are practically confined. The remaining 25 per cent. are of more or less local distribution, part being water birds confined to certain portions of the Atlantic, Pacific or Gulf coasts; part are more or less maritime land birds, while a few are limited to particular areas of comparatively small extent in the interior, or to a narrow belt along the Pacific coast. As will be noted later, some 28 species and 24 subspecies are confined to Lower California and its outlying islands.

The northern and southern differentiation of the Warm Temperate noted above serves, however, as a basis for primary subdivisions (secondary divisions of the Warm Temperate) of both the Humid and Arid provinces, each being separable into two *Subprovinces* (see Pl. IV). Thus the Humid Province is divisible into (1) an *Appalachian Subprovince*, consisting of the long recognized Alleghanian and Carolinian Faunæ, and (2) an *Austroriparian Subprovince*, consisting of the Louisianian Fauna, as commonly recognized. The Austroriparian Subprovince is Dr. Merriam's 'Louisianian or Austroriparian subregion' of his 'Sonoran' region; the Appalachian Subprovince is the northeastern part of his 'Sonoran,' left by him as an unnamed remainder after setting off and naming as 'subregions' all the other parts of his 'Sonoran Region.' The line separating these two subprovinces marks the southern limit of several northern genera and many northern species, and the northern limit of a still greater number of southern genera and species.

The Humid Province comprises three *faunæ*, as follows: (1) *Alleghanian*, (2) *Carolinian*, (3) *Louisianian*. These faunæ have been so long recognized, and have recently been so well mapped by Dr. Merriam,[1] that a detailed account of them may be here omitted.

The Arid Province not only extends, as already stated, from the eastern edge of the Great Plains to the Pacific coast, but also northward over the Saskatchewan Plains, the Plains of the Colum-

[1] N. Am. Fauna, No. 3, map 5.

bia, and thence northward into southern British Columbia. It thus includes the so-called 'Central' and 'Pacific' Provinces of Baird and most subsequent writers, excepting of course the more elevated parts of the Rocky Mountain plateau. It is thus coëxtensive with Dr. Merriam's 'Arid Sonoran.' While it is true that a narrow belt along the Pacific coast, from southern California northward to the Alaskan Peninsula, possesses a few peculiar types, and lacks a few of those occurring in the region immediately to the eastward, the differentiation is on the whole too slight to give the Pacific coast district the rank of a region coördinate in grade with the formerly so-called Middle and Eastern Provinces. These differences serve at best merely to mark off from the interior region at large a tier of narrow coast faunæ of the same grade as those bordering the Atlantic coast, although the latter, owing to the widely different physiography of the eastern and western borders of the continent, have a much greater east and west extent.

The Arid Province, like the Humid, is divisible into two *subprovinces*, namely, (1) a northern or *Campestrian Subprovince*, and (2) a southern or *Sonoran Subprovince* (see Pl. IV). These two regions correspond respectively with Dr. Merriam's 'Arid Upper Sonoran' and his 'Arid Lower Sonoran'; just as the two subprovinces of the Eastern Province correspond with his 'Humid Upper Sonoran' and 'Humid Lower Sonoran,' as laid down on his 'Second Provisional Bio-geographic Map of North America,' except that the 'humid' and 'arid' portions of his 'Transition Zone'[1] are also included respectively in the Alleghanian and Campestrian Subprovinces. The Sonoran Subprovince is equal to Dr. Merriam's restricted 'Arid or Sonoran subregion proper' plus his 'Lower Californian subregion,' while the Campestrian Sub-province includes his 'Great Basin subregion' and his 'Great Plains subregion.'[2] The name 'Campestrian' has reference to the fact that this subprovince is largely made up of plains, including as it does the greater part of the Great Plains, the Plains of the Saskatchewan, and the Plains of the Columbia and Snake Rivers.

Many species are limited in their southward distribution by the southern border of the Campestrian Subprovince, but few genera

[1] *Cf.* Proc. Biol. Soc. Washington, VII, 1892, pp. 26-33, and accompanying map.

[2] *Cf.* N. Am. Fauna, No. 3, 1890, p. 25.

appear to be thus restricted. This boundary also forms about the northern limit of many species and genera of the Sonoran Subprovince. These two subprovinces are hence characterized mainly by the presence of a large number of forms found in the Sonoran which are absent from the Campestrian, and are thus distinguished, like many northern divisions when compared with adjoining southern ones of coördinate rank, from the Arctic southward, by what they lack rather than by the posession of any peculiar types.

The Campestrian Subprovince itself may be divided into three areas which may be termed *districts*, namely (1) the *Great Plains District*, (2) the *Great Basin District*, and (3) the *Pacific Coast District*. (See Pl. IV.) The first two are respectively the 'Great Plains subregion' and the 'Great Basin subregion' of Dr. Merriam's first 'Biological Map of North America.'[1] Although these two districts are separated by the main chain of the Rocky Mountains, they are faunally but slightly differentiated. But few genera occur in the one that do not occur in the other; a few species, and a larger number of subspecies are restricted to one or the other during the breeding season, but they often become more or less mixed during winter, when they meet on common ground in the Sonoran Subprovince. Thus the Rocky Mountains, while forming so imposing a feature in the configuration of the continent, fail to be by any means an impassable barrier to the dispersal of species, owing to their numerous comparatively low depressions, and to their meridional trend.

The Pacific Coast District consists of a narrow belt situated mainly west of the Sierra Nevada and Cascade Ranges, and is characterized by the presence of a few species and a considerable number of subspecies mainly restricted to it.

The Sonoran Subprovince consists of Dr. Merriam's restricted 'Sonoran subregion,'[1] with the addition of Lower California, which Dr. Merriam gave the rank of a 'subregion.' A careful synopsis of the bird life of Lower California and its outlying islands shows that it has 28 species and 24 subspecies which are not found in the United States. Of the 29 species 10 are confined exclusively to the outlying islands, and 9 others are either strictly

[1] N. Am. Fauna, No. 3, 1890, p. 25, and map 5.

maritime or pelagic. Of the 10 peculiar land birds, all but one are congeneric with and for the most part closely allied to North American species. Of the 24 subspecies, 23 are merely local races of North American species. A number of these peculiar species and subspecies are confined to the subtropical portions of the region below La Paz, which belongs to the American Tropical Realm rather than to the Temperate Realm, thus leaving very little of distinctive importance for the non-tropical portion of the Peninsula.

It is at present impracticable to attempt to define in detail the numerous faunæ of the Arid Province. While certain portions might be thus treated, our knowledge of the region as a whole is too defective to warrant even a provisional subdivision into faunæ. The same is true also of the southern prolongations of the Cold Temperate along the mountain ranges of the western half of the continent. It is evident, without going into a detailed analysis, that many of the wide-ranging species that prevail over and give character to the Arctic, Hudsonian, and Canadian Faunæ, respectively, are absent from the Rocky, the Cascade, and the Sierra Nevada ranges and their outlying spurs; also that many eastern forms are here replaced by more or less closely related western forms, and that quite a number of peculiar mountain types are superimposed upon this new combination. The case is obviously quite different from the conditions met with in the Alleghanies, where merely a small percentage of Canadian forms occur far to the southward of where they are found in the contiguous lowlands. To give due expression to the faunal conditions met with, for example, in the Rocky Mountains south of the Canadian Pacific Railroad, it evidently will be necessary to recognize a succession of mountain faunæ as we go southward, as well as in descending from timber-line at any given point to the foot-hills. Dr. Merriam, in defining the life zones at high elevations in Arizona, Idaho, and California, has made an excellent beginning in this comparatively new line of work, and we may confidently look forward to still more important results from the great mass of unpublished data he has so industriously brought together. The proper collation of our mountain areas, from the British boundary across the United States into Mexico, will be a work of exceptional interest and importance, and will require much additional field research.

As already noted, the extreme southern portions of North America belong to the American Tropical Realm, which consists of tropical America at large. It thus includes not only a large part of South America, Central America and the West Indies, but the lowlands of Mexico, including the low eastern coast region to some distance north of the mouth of the Rio Grande, and the low western coast to some distance north of Mazatlan. To the Tropical Realm belong also the extreme southern portion of the peninsula of Lower California, and the extreme southern portion of the peninsula of Florida. There are thus three small portions of 'North America,' as defined in the A. O. U. Check-List, which belong with the Tropical rather than to the North Temperate Realm.[1]

The fauna of neither of the tropical areas within the United States is typically tropical, but the infusion of tropical elements is so great as to render them tropical rather than temperate. They have also little in common with each other, as would be naturally anticipated from their wide geographical separation through the interposition of the Gulf of Mexico, thus preventing a tropical land connection. Consequently the Floridian area, or the *Floridian Fauna*, as it has long been technically known,[2] belongs to the Antillean Region of the American Tropical, while the Texan area is an outlying arm of the Central American Region of the American Tropical. The tropical portion of Lower California also belongs to the Central American Region.

The Floridian Fauna has recently been treated in much detail by Dr. Merriam,[3] and hence need not be considered at length here. The following birds, however, may be mentioned as among those distinctively characteristic of this limited area, though having generally a very extended range into tropical America.

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[1] See maps, plates III and IV, where the uncolored portions to the south of the colored areas belong to the Tropical Realm. The uncolored portion at the top of plate III may be taken as representing that portion of the continent belonging to the Arctic.

[2] *Cf.* Bull. Mus. Comp. Zoöl., II, 1871, p. 391. — The general provisional northern limit here given—"near the latitude of Lake George"—proves to have been carried a little too far north, its limits as now recognized being Cape Malabar on the east coast and Tampa Bay on the west coast. (*Cf. Merriam*, Proc. Biol. Soc. Washington, VII, 1892, p. 33.)

[3] *Cf.* Merriam, Proc. Biol. Soc. Washington, VII, 1892, pp. 52-54.

Sula sula
Fregata aquila
Phœnicopterus ruber
Ardea occidentalis
Aramus giganteus
Columba leucocephalus
Zenaida zenaida
Rostrhamus sociabilis
Buteo brachyurus
Polyborus cheriway
Speotyto cunicularia floridana
Crotophaga ani
Coccyzus minor maynardi
Euetheia bicolor
Ammodramus nigrescens
Vireo altiloquus barbatulus
Cœreba bahamensis

The semi-tropical area occupying the extreme lower portion of the Rio Grande Valley and extending as a narrow belt thence northward for a short distance along the Texas coast, and also southward along the Mexican coast to the neighborhood of Tampico, I have recently designated[1] as the *Tamaulipan Fauna.* Among the birds that extend northward from the tropics to find here about their northern limit are the following:—

Podiceps dominicus
Ortalis vetula maccalli
Engyptila albifrons
Buteo albicaudatus
Crotophaga sulcirostris
Trogon ambiguus
Nyctidromus albicollis merrilli
Amazilia fuscicaudata
Amazilia cerviniventris
Pitangus derbianus
Myiozetetes texensis
Xanthoura luxuosa
Embernagra rufivirgata
Sporophila morelleti sharpei
Euphonia elegantissima
Vireo flavoviridis
Compsothlypis nigrilora
Geothlypis poliocephala palpebralis
Basileuterus culicivorus
Harporhynchus longir. sennetti

The Tamaulipan Fauna has fewer distinctively tropical types than would be expected from its low altitude and geographical position. This is doubtless due to the extreme aridity of the country, since in the forest regions further inland under the same parallels Trogons, Motmots and Parrots occur to a much greater extent than in the arid, nearly treeless coast region.

The extreme southern portion of Lower California, from about La Paz southward, may be considered as fairly subtropical, but contains, on the whole, comparatively few distinctively tropical types of birds. Among such may perhaps be placed the following:—

[1] Bull. Am. Mus. Nat. Hist. IV, p. 241, Dec. 1892.

Glaucidium hoskinsi	Dendroica bryanti
Crotophaga sulcirostris	Geothlypis beldingi
Dryobates scalaris lucasanus	Harporhynchus cinereus
Basilinna xantusi	Campylorhynchus affinis
Empidonax cineritius	Merula confinis
Empidonax griseus	

A few additional subspecies of northern forms also characterize the subtropical portion of the peninsula, which may perhaps well bear the name *Saint Lucas Fauna.*

Independently of the subdivisions already enumerated, and in addition to them, North America may be divided into a number of transcontinental belts or *Zones* in accordance with the climatic conditions prevailing over the different parts of the continent. Several of these zones have been repeatedly recognized by various writers on the distribution of animals and plants. A division of extra-tropical North America into about seven zones will greatly facilitate the correlation of the faunæ of different regions. These are, (1) the Arctic or Hyperborean Zone, equivalent to the American portion of the Arctic Realm; (2) the Subarctic or Hudsonian Zone; (3) the Cold Temperate or Canadian Zone; (4) the North Warm Temperate or Alleghanian Zone; (5) the Middle Warm Temperate or Carolinian Zone; (6) the South Warm Temperate or Louisianian Zone; (7) the Subtropical or Floridian Zone.[1] Dr. Merriam has already in his recent papers on the distribution of North American mammals distinguished these zones more or less definitely in treating of the life zones of the San Francisco Mountain region in Arizona and in Idaho. He has done much also toward correlating the life zones of mountain faunas with the long recognized faunæ of the Atlantic Coast. Much further information is required before these zones can be geographically defined over the western half of the continent.

In selecting names for their designation several alternatives present themselves, as for example, names derived from the climatic zones, or from some leading characteristic, as 'Spruce

[1] This is a modification of my recently published classification (Bull. Am. Mus. Nat. Hist., IV, p. 240), rendered necessary from the evident desirability of reserving the term 'Subtropical Zone' for the designation of the most northern belt of the Tropical Realm, instead of applying it to the lowest or most southern belt of the Temperate Realm, as is done when it is used for the Louisianian Zone.

Zone' for the Hudsonian, 'Arctic-alpine' for treeless mountain summits equivalent in character to the Arctic, etc., or from those of the Atlantic coast faunæ. This latter method has the merit of at once suggesting a well-known standard of comparison when applied to belts in the interior or on the Pacific coast, representative of the commonly recognized faunæ of the Atlantic coast.

Dr. Merriam has already recognized the equivalents of the Arctic, Hudsonian, Canadian, Alleghanian, etc., in portions of the mountainous districts of the West, and has presented in substance the following correlations.[1]

Zone.	*Fauna.*
Alpine	Arctic.
Subalpine or Timber-line	
Hudsonian or Spruce	Hudsonian.
Canadian or Fir	Canadian.
Neutral or Pine	Alleghanian.
Piñon or Cedar	[Carolinian].
Desert	[Louisianian].

2. *Classification and Nomenclature.*

A few words in regard to the names chosen for the several major divisions of the North American Region, and the choice of names in general in bio-geography. It is natural that the influences controlling the geographical distribution of life, namely, climate, and hence the principal climatic zones, should suggest the names of many of the larger ontological regions; and we find that to a large extent such names have been chosen, as by Dana, in 1852, in discussing the distribution of marine life, and by botanists generally, and notably by German writers. For the lesser regions geographical names, as Hudsonian, etc., are admirably appropriate when suggestive of some characteristic portion of the region in question. Whenever feasible, names first given should be retained in preference to later names.

In concluding this paper a few words of explanation are necessary in relation to various points of nomenclature and classification. In comparing the present scheme of faunal areas of North

[1] N. Am. Fauna, No. 3, 1890, pp. 7–34, and maps 1–4; *ibid*, No. 5, 1891, pp. 9–12, 21–25.

America with those employed by Dr. Merriam in his recent well-known admirable papers on the geographical distribution of North American mammals, so frequently cited in the preceding pages, it will be noticed that there is a striking agreement in their number and boundaries, although a few new minor divisions have here been introduced; yet the terms employed for their designation are to a great extent different. As already intimated, the present system of classification and nomenclature is a further development of that first instituted by me in 1871, and used later in 1878, and now carried out in greater detail and extended to the whole North American Continent. The present revision of the subject is therefore not to be looked upon as unfriendly criticism of Dr. Merriam's classification and nomenclature, which he evidently adopted provisionally,[1] selecting such terms as would suffice to clearly indicate the areas under discussion; his attention was given mainly and most successfully to an elucidation of the facts of distribution; a detailed consideration of the nomenclature of the subject was outside of his special field.

In attempting to establish a consistent scheme of classification and terminology, the aim is to assign definite terms for areas of similar taxonomic grade. Many of the terms in more or less current use have been employed so loosely, and used in so many different senses by different writers, that, as already said, a strict 'rule of priority' cannot be enforced, at least without leading in many instances to very unsatisfactory and inharmonious results. As already explained, the system here adopted is analogous to the schemes followed in systematic biology and stratigraphic geology. In the selection of names for the higher divisions, reference has been had to the influences controling the geographic distribution of life, namely, *climate*, and the climatic zones have been allowed to suggest the names of many of the major ontological areas. Indeed, such names have been employed before in nearly the same sense, not only by physical geographers, but by many botanists and some zoölogists. Thus 'Humid' and 'Arid' become appropriate and suggestive designations for the eastern and western subdivisions of the North American Warm Temperate Subregion. For the lesser regions geographical

[1] This is not only apparent from his papers, but I am informed by him that this was intentionally the case.

names, as 'Hudsonian,' etc., are admirably appropriate when suggestive of some characteristic portion of the region in question. Terms designating grade should, of course, be used with the same strictness as the corresponding terms,—order, family, genus, etc., expressive of rank,—in biology.

Realm is employed as a designation for primary regions, taking the world at large, and Fauna for the ultimate subdivisions. Region, the term selected for divisions of the second rank, has been used by different writers for areas of various grades, but it is proposed to limit its application in a technical sense to the primary divisions of Realms. Below this, in successively descending order, we have Subregions, Provinces, Subprovinces, Districts and Faunæ; faunæ being subdivisions of districts (in cases when it seems desirable to recognize districts), while districts are the primary subdivisions of the subprovinces. In the Arctic Realm the only subdivisions it seems necessary to recognize are faunæ; in the Cold Temperate, possibly both districts and faunæ; in the Warm Temperate, at least so far as North America is concerned, it seems desirable to recognize (1) provinces, (2) subprovinces, (3) districts, and (4) faunæ.

As early as 1878[1] I separated the 'North American Region' into two *Subregions*, namely, a *Cold Temperate Subregion* and a *Warm Temperate Subregion*, as is done in the present paper, using these terms as headings in tables giving the distribution of the genera of North American mammals. Baird's 'Eastern,' 'Middle,' and 'Western' *Provinces* were recognized as "natural regions," with the designation of 'Provinces,' but with the Eastern Province modified so as to restrict it to the Warm Temperate Subregion, and all three reduced in grade to regions of the third rank[2] instead of the second rank as regarded by Professor Baird.

In 1883 Dr. Packard[3] substantially adopted this classification in treating of the faunal regions of North America, with, however, a change of name for the 'Cold Temperate Subregion,' he

[1] Bull. U. S. Geol. and Geogr. Survey (Hayden), IV, 1878, pp. 338-344.

[2] That is, of the North American Region; really of fourth rank, considered from the basis of the world as a whole.

[3] Twelth Ann. Rep. U. S. Geol. and Geogr. Survey (Hayden), pt. I, 1883, pp. 362-370, and map; the latter republished in the Third Rep. U. S. Entomol. Comm., 1883, map iv.

life areas in a country where there are no impassable physical barriers to prevent the diffusion of animals and plants." [1]

Dr. Merriam's generalizations respecting the Central Province of authors mark an important advance in the study of North American bio-geography. Taking this region with its original boundaries and significance it is a highly artificial division, embracing within its area very unlike faunal elements. Eliminating from it, however, the broad central arm of the 'Boreal' or Cold Temperate Subregion, which occupies so much of the great central plateau, relieves it of an extraneous element, and reduces it to a more natural and geographically quite different region.

The first discrepancy between Dr. Merriam's classification and my own that requires notice is in respect to the primary divisions of the North American Region, which he first termed 'Provinces'[2] and later 'Regions,'[3] with the prefixes 'Boreal' and 'Sonoran' respectively for the 'Cold Temperate' and 'Warm Temperate' *Subregions* of the present writer. The use of Boreal, however, as shown above, was not an innovation; but the term 'Sonoran' was used in a new and greatly extended sense, the term Sonoran being applied to a region identical in geographical extent with the Warm Temperate,—a designation previously used for the same area,—and hence including the region east of the Mississippi (as well as that west of it), from the Great Lakes and southern New England south to Florida and the Gulf Coast. The terms 'Sonoran' and 'Sonoran Province' were used as early as 1866 by Prof. Cope,[4] and also later by Cope, Heilprin, and others, for a region of comparatively small extent, consisting of Sonora and adjoining portions of Arizona and New Mexico. In 1887 Heilprin[5] extended the region to include "the peninsula of Lower California, the State of Sonora in Mexico, New Mexico, Arizona, and parts, not yet absolutely defined, of Nevada, California, Texas, and Florida," and modified its title by calling it the 'Sonoran Transition Region.' The Sonoran Province or Region of these authors is thus not at all the 'Sonoran Region' of Merriam, which is an area of much greater extent and of higher rank.

[1] N. Am. Fauna, No. 3, pp. 22, 23.
[2] N. Am. Fauna, No. 3, p. 19, 20.
[3] Proc. Biol. Soc. Washington, VII, 1892, pp. 22, 26.
[4] Proc. Acad. Nat. Sci. Phila., 1866, p. 300.
[5] The Geogr. and Geol. Distrib. of Anim., p. 106.

The term Sonoran, used in this extended sense, seems at least inappropriate if not misleading, as there are few if any strictly 'Sonoran' types represented in that portion of the United States situated to the eastward of the Mississippi River. The more descriptive and appropriate designation of 'Warm Temperate' is therefore preferred for the region in question, since it not only has priority, but is in harmony with the terms Arctic, Cold Temperate, and Tropical, used currently for other coördinate areas of the continent.

Another, and perhaps the only other, important discrepancy between Dr. Merriam and myself is in respect to the primary subdivisions of the Warm Temperate or 'Sonoran' Subregion. Here the difference is in respect to classification, Dr. Merriam dividing the Warm Temperate into two transcontinental divisions which he terms respectively 'Upper' and 'Lower Sonoran'; while according to my best judgment the primary division is in a meridional line into an eastern and a western division, which I have termed respectively Humid and Arid Provinces, borrowing the terms from Dr. Merriam, who has used them in the same geographical sense but not in the same nomenclatural relation, as already shown in preceding pages. As the evidence, pro and con, has already been submitted (see *antea*, pp. 128–131, and Bull. Am. Mus. Nat. Hist., IV, pp. 230–232), it is unnecessary to rediscuss the matter here.

In respect to the subdivisions respectively of the Humid and Arid Provinces, my subprovinces correspond to his secondary divisions of the 'Sonoran' (with slight modifications, as already explained), my Appalachian Subprovince being essentially his 'Humid Upper Sonoran,' my Austroriparian Subprovince his 'Humid Lower Sonoran,' my Campestrian Subprovince his 'Arid Upper Sonoran,' and my Sonoran Subprovince his 'Arid Lower Sonoran.' My division of the Campestrian Subprovince into Districts conforms nearly with Dr Merriam's division of the same geographical area,[1] and I have adopted for these areas the same descriptive appellations.

Taking Dr. Merriam's latest paper on the faunal areas of North America and accompanying map,[2] one other point of difference calls for notice, namely, his recognition of a 'Transition

[1] N. Am. Fauna, No. 3, p. 25.

[2] Proc. Biol. Soc. Wash., VII, pp. 1–64, April, 1892.

Zone,' interposed between and separating the Cold Temperate, or 'Boreal,' from the Warm Temperate, or 'Sonoran' (l. c. pp. 30–33). This is equivalent to what is termed in this paper the Alleghanian Zone, and forms the northern transcontinental belt of the Warm Temperate. This zone was first recognized by Dr. Merriam in the West as the 'Neutral or Pine Zone,'[1] and correlated later with the Alleghanian Fauna of the East, as the 'Neutral or Transition Zone.'

The Alleghanian Zone is beyond question a transition belt, being necessarily so from its geographical position; its affinities, however, are decidedly with the Warm Temperate division of the continent rather than with the Cold Temperate, as the case was first interpreted by Dr. Merriam,[2] since its northern boundary coincides closely with the northern limit of distribution of a large number of southern genera of both plants and animals, including most of the staple grains and fruits of the Warm Temperate Zone.

As is well known, there is always a belt of neutral territory along the common boundary line of two adjoining areas, varying in breadth with the rank of the two areas; and the present case of the Alleghanian Zone is thus not exceptional. All things considered it therefore seems best to regard it as the northern transcontinental belt of the Warm Temperate, rather than to give it the anomalous position of a minor faunal area interposed between and completely separating two areas of a higher grade.[3] Besides, the term 'transition,' for reasons already given, is not a distinctive designation for a faunal area of any grade, although it has been repeatedly used in this way by different writers; its proper function is that of a descriptive term—not a designation to be used in a taxonomic sense.

The various faunal areas recognized in the present paper may be tabulated as follows:—

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[1] N. Am. Fauna, No. 3, 1890, p. 11, map 5.

[2] N. Am. Fauna, No. 3, p. 20, and *ibid.*, No. 5, p. 21.

[3] In biology 'aberrant,' 'transition' or intermediate genera are frequently met with, and in some cases it is difficult to refer them to one of the two subfamilies to which they are allied rather than to the other. Yet we feel compelled to refer them to one or the other, or else to make a new subfamily for the aberrant genus, in case it shows sufficient differentiation, rather than to leave it as an isolated genus, with the rank of a genus, to be interposed between two subfamilies, or families, as the case may be.

Tabular Synopsis of the Faunal Areas of North America.

REALMS
- Arctic.
- North Temperate.
- American Tropical.

REGIONS
- North American < *North Temperate Realm.*
- Central American } < *American Tropical Realm.*
- Antillean }

SUBREGIONS
- Cold Temperate } = *North American Region.*
- Warm Temperate }

PROVINCES
- Humid } = *Warm Temperate Subregion.*
- Arid }

SUBPROVINCES
- Appalachian } = *Humid Province.*
- Austroriparian }
- Campestrian } = *Arid Province.*
- Sonoran }

DISTRICTS
- Great Plains }
- Great Basin } = *Campestrian Subprovince.*
- Pacific Coast }

FAUNÆ[1]
- Barren Ground } *Arctic.*
- Alaskan-Arctic }
- Aleutian } *Cold Temperate.*
- Hudsonian
- Canadian
- Sitkan
- Alleghanian } *Humid Warm Temperate.*
- Carolinian
- Louisianian
- Floridian } *Tropical.*
- Tamaulipan
- Saint Lucas

ZONES
- Arctic or Hyperborean.
- Subarctic or Hudsonian.
- Cold Temperate or Canadian.
- North Warm Temperate or Alleghanian.
- Middle Warm Temperate or Carolinian.
- South Warm Temperate or Louisianian.
- Subtropical or Floridian.

[1] Mainly those of Eastern North America only.

NOTES ON THE PLUMAGE OF SOME BIRDS FROM UPPER SOUTH CAROLINA.[1]

BY LEVERETT M. LOOMIS.

IN THE years I have spent in field study of the birds of South Carolina I have incidentally collected specimens illustrating various phases of plumage. This material I have compared at the American Museum of Natural History, and the notes which follow are the result of this comparison or have been suggested by statements current in the literature.

Buteo borealis. — A moulting specimen, July 3, 1879, has worn rectrices that are grayish brown and numerously banded, and new ones (in various stages of development) that are rufous, with conspicuous subterminal bar of black. In an example (♂ juv., Sept. 25, 1884) of the Western form *calurus*, from Arizona, in the collection of the American Museum, there is a rufous tinge on the tail. In some of the lateral feathers it is slight, but in the majority it predominates. The former specimen shows that the transition from the immature to the rufous-colored tail may be effected at one moult, the latter that the transition may be more gradual. It remains to be determined whether this dual manner of assumption of adult plumage is characteristic in both subspecies or whether the more gradual change is peculiar to the one and the abrupt to the other.

An adult female, Dec. 17, 1881, from South Carolina, approaches *calurus*. It is more typical in respect to intensity of color than some examples in the American Museum, from Arizona, labelled *calurus*. It seems preferable, notwithstanding the established fact of southeasterly migration, to regard this specimen as an extreme dark phase of *borealis* rather than a bird of Western birth. It is a safe rule not to admit a subspecies, supposed to be extralimital, into a fauna upon the strength of a single specimen, unless the specimen typically exemplifies all the characters of the subspecies.

The last, like the first specimen noticed, has a broad subterm-

[1] Unless otherwise stated, the particular locality in each instance is Chester County.

inal bar of black on the tail. In another adult female, Dec. 19, 1878, this is wanting, a few isolated spots and faint traces being the only indications of it. It may be questioned whether this subterminal marking is simply individual, or whether it is an indication of immaturity.

Ceryle alcyon. — In a female taken Dec. 13, 1877, the rufous abdominal belt is complete. This is also the case in eleven specimens in the American Museum obtained at various seasons.

Ceophlœus pileatus. — A male, shot Oct. 11, 1886, exhibits a tendency to extension of the red of the head to the broad white stripe on its sides, there being a dash of this color below the eyes and backward.

Antrostomus vociferus. — The absolute necessity of determining the sex by dissection is strikingly exemplified in a female of this species (April 14, 1888), which has the throat bar chiefly pure white. It is much narrower than is usual in the male. The other markings are not exceptional. There is a nearly similar specimen in the American Museum collection from New York, procured May 31, 1883.

Calcarius pictus. — A female, Feb. 9, 1889, has the lesser wing-coverts deep black with a broad terminal bar of pure white.

Guiraca cærulea. — Wilson in his description of this species says, "The female is of a dark drab color, tinged with blue, and considerably lightest below." More recent writers appear to have overlooked that the female in high plumage exhibits considerable blue coloration, attesting that Wilson even at this day may be consulted with profit in matters relating purely to the technics of ornithology. The following descriptions of two specimens illustrate the higher colors assumed by the female.

♀ *ad.* (Aug. 25, 1885). Crown, rump, jugulum, fore breast, malar region, and lesser coverts, blue; occiput, auriculars, throat and neck all around, scapulars, edge of wing, upper tail-coverts, outer edges of rectrices, except lateral pair, strongly tinged with blue. This specimen is in worn plumage with three rectrices in process of renewal.

♀ *ad.* (May 7, 1891). Top of head, fore part of cervix, throat, jugulum, malar region, rump, lesser coverts, and edge of wing, blue, obscured by brownish tips to the feathers, particu-

larly from the occiput backward; rectrices, except outer pair, edged exteriorly with blue, and alula, primaries, and primary coverts with bluish; upper tail-coverts and auriculars tinged with blue, the former tipped with whitish; sub-apical portions of feathers on breast and sides of neck decidedly bluish; middle and greater coverts tipped with ferruginous.

In brief, the blue in these two specimens chiefly prevails about the head, jugulum, rump, and lesser wing-coverts. If the tips of the feathers were worn off in the second specimen as in the first, the concealed blue would be extensively unveiled and a richer attire would result.

I am constrained to believe that this blue phase represents the adult plumage of the female, and that the plain one generally described in the books is an immature stage, for every season highly colored females have been obtained in numbers fully equal to the adult males of highest feather. Also, plain females and those with but slight traces of blue have occurred in proportion to the more soberly dressed males. Further proof that this high coloration is indicative of maturity is found in the fact that the hornotines I have taken in the fall moult have displayed no sign of it. Failure of sexual vitality has been advanced as an explanation in somewhat similar cases. That such physical change is not the cause in the present instance has repeatedly been proven by dissection and by capture of mated birds. A tendency to assumption of the more showy costume of the male has been observed in *Passerina cyanea*, *Piranga rubra*, and *Dendroica cærulescens*. It is highly probable that parallels are to be found in many if not all species in which the male and female differ widely in color. It is a question whether the variation in these cases may not be individual. Special investigation in each species alone will decide the matter.

An immature male with testes partially enlarged, taken May 18, 1891, has the blue chiefly confined to the sides of the head. In a series, the two females described above would far more readily be picked out as immature males. In the spring of 1890 males in full dress were secured from the outset. The following year only those in brown and blue plumage were obtained up to May 19, the last day search was made. Where the deeper colored plumage was concealed by brown tips to

the feathers, the juvenile appearance of the birds of the second season appeared to be due to a retarding of the process of abrasion, which wearing away of the terminal portions of the feathers is manifest in this species from its first arrival in this locality.

Piranga erythromelas. — There is a marking on the under surface of the wing in the female and in the male in green livery which seems to have escaped general notice, but which renders both distinguishable at a glance from the female or young male of *P. rubra*. It extends from the carpal joint to the exposed shaft of the outer primary, and is about an inch in length and an eighth of an inch in width and olive brown in color. It corresponds to a similar black marking in the adult spring male. In all examples of *P. rubra* I have examined the region of the under wing-coverts is uniform yellow in the female and red in the adult male.

Piranga rubra. — The following description is of a female, with ovary of a breeding bird, taken June 2, 1879. Prevailing color above brownish gray, with touches of olive-yellowish; under surface cream-color, washed with Naples yellow, with a patch of chrome yellow on breast. Three males and a female of subspecies *cooperi* in the American Museum resemble this specimen in their faded appearance.

Helminthophila chrysoptera. — A female from Cæsar's Head, June 16, 1891, shows an indication of albinism in the continuation of the white of the malar region over more than half of the throat and chin.

Helminthophila celata. — In a fall male and a spring female the eyelids are edged with whitish, forming an orbital ring which was very distinct when the birds were in the flesh.

Dendroica cærulescens. — The black feathers of the throat and chin are without white tips in a male obtained Oct. 2, 1888, and the scapulars and interscapulars are distinctly spotted with black, and unwashed with olive green. The whole appearance of the specimen is that of a spring male in high feather. The exterior edges of several of the outer primaries, near their extremities, are, also, whitish, constituting a rather distinct area when the wing is closed. In another October example the dorsal streaks are so heavy and numerous as to present the ap-

pearance of a black patch, nearly as conspicuous as the olive green one in *Compsothlypis americana*. In still another, the crown is thickly marked with black shaft lines.

Dendroica castanea. — In a male, May 5, 1888, the buff on the sides of the neck is continued into a broad cervical collar, streaked with dusky. Another May specimen, also a male, shows indications of a similar collar.

Geothlypis formosa. — Breeding females of this species from Mt. Pinnacle and Cæsar's Head are duller colored on an average than the males. The black, especially, is less intense, and considerably restricted. In some it is nearly wanting on the crown. The brightest females and the dingiest males, however, are indistinguishable.

FURTHER NOTES ON THE EVENING GROSBEAK.

BY AMOS W. BUTLER.

In addition to the records of the range of the Evening Grosbeak (*Coccothraustes vespertinus*), given in 'The Auk' for July, 1892, I am enabled, through the kindness of several friends, to offer some additional notes.

In the winter of 1889–90 Evening Grosbeaks were tolerably common in the vicinity of Ft. Wayne, Indiana. Mr. C. A. Stockbridge, in addition to the two reported Feb. 15, 1890, noted eleven Feb. 16, one March 22, one April 9, and one April 12.

Mr. C. E. Aiken of Salt Lake City, Utah, informs me that a large number of specimens were obtained near Whiting Station, Indiana, in the winter of 1886–87 by Mr. R. A. Turtle of Chicago. To some few of these I have doubtless referred before.

Prof. F. Cramer, Lawrence University, Appleton, Wis., under date of March 14, 1891, says: "Two weeks ago a flock of five Evening Grosbeaks spent a few minutes on a tree in our back yard. They were quietly eating the little crab apples that had not fallen off the tree. Feb. 7 Professor Lummis saw a flock of ten eating the fruit of a climbing bitter-sweet near his house. They did not stay long."

Mr. T. McIlwraith, Hamilton, Ontario, very kindly sent me an account of his observations concerning these birds in the winter of 1889–90. He says: "The first flock was noticed on Dec. 22, 1889. I soon found their haunts, which I visited almost daily till the end of January when the eastern migration ceased. Passing flocks were again seen in March going rapidly westward, but the numbers were less, and they made no stay. In Canada they seemed to travel on a straight, narrow line from Windsor to Quebec, north or south of which they were not observed, till they reached the east end of Lake Ontario, when they scattered south through New York. Near Hamilton they frequented the north shore of the lake, where they fed on the berries of the red cedar; they were also noticed taking the seeds from such apples as remained on the trees at that season."

Mr. L. W. Watkins, Manchester, Michigan, has been very obliging in supplying me with the following notes: "Late in the fall of 1889 Washtenaw and other counties were visited by the Evening Grosbeak. They came in large flocks, sometimes two hundred or more. These flocks were scattered very generally over the country, about one flock to every six square miles. They frequented gardens, orchards, and dooryards. Towards dusk they all disappeared, but at early dawn they were back again in the apple orchards where they fed upon the apple seeds, cracking them open as do the tame canaries their hemp seeds. There were many frozen apples upon the trees and on the ground. These they pulled to pieces, rejecting all but the seeds. When the supply of fruit seeds gave out they ate maple seeds, but, so far as I have observed, they ate evergreen cone seeds only as a last resort. Their unwary nature, and high, bell-toned, garrulous chirrup attracted the attention of even the most unobserving. I resolved to try to capture some, thinking they might breed in confinement. In our yard was a crab-apple tree. The ground beneath it was covered with the little fruits. When the Grosbeaks had exhausted the supply of food in the orchard they came to this tree. When frightened, while upon the ground, they invariably flew straight up among the branches of that tree instead of flying off to some other. I arranged an old pigeon net among the branches to try to catch some. When coming to feed they always alighted in a body upon the ground, and did not alight

first upon the tree. I was only enabled to capture one, — a fine male, — and I could never repeat the netting. The captive was put into a large cage and he soon became accustomed to the new conditions. By using the captive as a stool pigeon, with the aid of some hemp seed, I was enabled to induce two males to enter the house. Suddenly I closed the entrance way, when they were easily caught. Although I often tried, I never could get a female to approach the cage. They seemed much more timid than the males. The three captives were very cross to each other, the bully being nearly as persistent in his attacks upon his companions as is the cock in the farmyard upon his rivals. Their food consisted of sunflower seeds, mixed canary seeds and apple seeds. When very hungry they would eat oats, but very reluctantly. Corn, wheat, barley, the pulp of fruit, and garden vegetables, they would not touch. Diptera, hymenoptera, lepidoptera and coleoptera were offered them and were refused. Angle worms and spiders were likewise uneaten. When caged, their note was changed from the usual chirrup to a shrill whistle or shriek, and, at times, they closely mimicked a young chicken when lost. They never sang, but occasionally chattered to each other with much animation. They also made sounds closely approaching a low warble. They always slept, at night, with the head under one wing. I was very anxious to know how they would stand the hot weather, but 90° F., in the shade, found them as unconcerned as in winter. Neither did they show any restlessness in spring, when their mates were leaving. A remarkable change was manifest after their first moult. The olivaceous and yellowish tints, in the new feathers, were turned to slaty drab and brownish green, respectively, though the pure yellow on forehead and scapulars remained as before, as also did the black and white portions. Thus they were changed from bright, attractive birds to very oddly and conspicuously trimmed birds of plain — rather dirty — color. Nor did this color change with the age of the feathers. The next summer showed the same shades. In the fall of 1891, after living in confinement two years, one after another died, not from neglect, but they seemed to pine away and die from the effects of captivity."

THE CHIONIDIDÆ.

(*A Review of the Opinions on the Systematic Position of the Family.*)

BY R. W. SHUFELDT.

EVER since the time that I first examined a skeleton of *Chionis minor* I have held that that species is related, in so far as its osteology is concerned, to the Plovers, and in July, 1891, I published in the 'Journal of Anatomy and Physiology' (London) an illustrated memoir upon this remarkable type, wherein I said that "*Chionis minor* probably constitutes one of the links among the Plovers and the Gulls, standing close up to the former and having its nearest living allies in *Hæmatopus* and such forms as *Glareola*. Recognizing this as we do, we cannot ignore, on the other hand, the impress it has at least received upon its skeleton from the columbo-gallinaceous group, and the Bustards, through the Plovers, seem to offer us a partial clue here, or missing links in the line through *Hemipodius*, or perhaps, too, in some yet unknown way, through *Syrrhaptes*, the other connecting forms having passed away, and left us only such conjectures as these to offer upon the position of *Chionis* in the system" (p. 524). Since the above was printed I have again re-examined my material and re-read the literature on the subject. My views remain practically unaltered.

The morphologist need not especially take into consideration the writings of naturalists upon the genus *Chionis* prior to 1836. In that year, however, M. De Blainville[1] anatomically examined the best part of a skeleton of a specimen of *C. alba*, and decided that *Chionis* was most nearly related to *Hæmatopus*. My figures and descriptions of the skeleton of *C. minor* in the 'Journal of Anatomy' seemed to me to lend substantial support to the opinion of that learned researcher, and there is no question but that he was pre-eminently correct about his views of the sternum.

[1] Blainville, M. H. D. De—Mémoire sur la place que doit occuper dans le système ornithologique le genre *Chionis* ou Bec-en-fourreau. Ann. Sci. Nat. VI, 1836, p. 97.

Nothing worthy of special note upon the structure of the bird appeared after De Blainville's contribution until Mr. Eyton published some observations twenty-two years afterwards,[1] and he was inclined to place the form near *Glareola*. Eleven years later Dr. Cunningham examined the larynx and parts of the digestive apparatus of a specimen of *Chionis alba*, and he remarked that "the legs present a decided resemblance to *Hæmatopus*, and the sternal characteristics are similar."[2] Professor Newton who has both described and figured the egg of *Chionis minor* has said that it "confirms by its appearance the systematic position of the form [*C. minor*] shown by osteology, its affinity, namely, to the Plovers."[3] The literature of the subject is next materially enhanced by the appearance of the memoir by Doctors Kidder and Coues,[4] and those distinguished writers distinctly dissent from the views of De Blainville and all foregoing authors on the subject, and are lead to believe that "*Chionis* stands between grallatorial and natatorial birds, retaining slight but perfectly distinct traces of several other types of structure" (p. 109); and further: "We thus find in *Chionis* a connecting link, closing the narrow gap between the Plovers and Gulls of the present day. In our opinion, this group represents the survivors of an ancestral type from which both Gulls and Plovers have descended. And this opinion is strongly supported by the geographical isolation of its habitat, affording but few conditions favorable to variation" (p. 114). They propose the group Chionomorphæ to contain the two known species *C. minor* and *C. alba*, the "Chionomorphs" then "constituting exactly the heretofore unrecognized link between the Charadrimorphs and Cecomorphs, nearer the latter than the former, and still nearer the common ancestral stock of both." They were further of the opinion that *C. minor* is "undoubtedly nearest to the ancestral type" and therefore called it *Chionarchus minor*. Messrs. Sclater and Salvin in their 'Nomenclator' include the Chionididæ in their

[1] Eyton, T. C.—Note on the skeleton of the Sheathbill (*Chionis alba*). Proc. Zool. Soc. XXVI, 1858, pp. 99, 100.

[2] Cunningham, R. O.—On *Chionis alba*. Jour. Anat. and Phys., Nov., 1869, pp. 87-89.

[3] Newton, Alfred—Proc. Zool. Soc., Jan. 17, 1871, p. 57, pl. iv, fig. 7.

[4] Kidder, J. H., and Coues, E.—Bull. U. S. Nat. Mus., No. 3, 1876, pp. 85-116.

group 'Limicolæ,' which leads us to infer that they believed it to be most nearly related to the Plovers.[1] In 1880 Mr. Sclater still retained the 'Chionididæ' in the Limicolæ, placing the family between the Charadriidæ and the Thinocoridæ.[2] Garrod, who was always prone to lay too great stress upon single characters, sustained Kidder and Coues in their opinion upon the affinities of *Chionis*, and believed them to be chiefly larine. He adds, nevertheless, "that the genus deserves to be located in a separate division, however, as Dr. Coues suggests, I cannot agree," and further "that Dr. Coues's account of the myology of *Chionis minor* is incomplete as far as the varying muscles are concerned." Strange to say, Garrod found, in studying the muscles, the following, directly militating against his expressed opinion — namely, the Laridæ all lack the accessory femoro-caudal, while certain of the Charadriidæ as well as both *Chionis minor* and *C. alba* possess it. Every one of these families possesses the ambiens.[3] Now the principal fault to be found in the work of Doctors Kidder and Coues, is that the major part of their dissections were *not made comparative*. As Garrod noticed, their dissections of the muscles is extremely deficient. Their studies of the 'viscera' of *Chionis* are even more so, and, finally, there is barely any evidence whatever in their study of the skeleton of *C. minor* that it was critically compared with the skeletons of such genera as *Larus*, *Hæmatopus*, *Alca*, or a species of the *Gallinæ* Professor Parker who was always great in his comparisons of the details in the skeletons of many kinds of birds from every conceivable group, and who possessed clear taxonomical ideas in his generalizations, as a rule, believed, when he gave his 'scheme' of the relationships of *Pluvialis*, that the Plovers through *Hæmatopus* and *Chionis* were connected with the Tubinares on the one hand, and through *Glareola* and *Sterna* were connected with the Laridæ upon the other. That Parker spoke of *Chionis* as a "thoroughly *marine* Plover," and not as a thoroughly *terrestrial* Gull, is good evidence upon what he thought about the

[1] Sclater, P. L., and Salvin, O.—Nomenclator Avium Neotropicalum, p. 142. 1873.

[2] Sclater, P. L.—Remarks on the Present State of the Systema Avium. Ibis (4 ser.), IV, 1880, p. 340.

[3] Garrod, A. H.—Coll. Sci. Mem. pp. 221, 222, 419. 1881.

affinities of the Sheathbill.[1] It is worthy of mention, too, that in 1882 Dr. Reichenow[2] placed *Chionis* near *Hæmatopus*, and Burmeister was of the same opinion.

Other authors, both early and recent, have held diverse opinions as to the affinities of the Chionididæ, and we still stand in need of a complete study of the entire structure of *Chionis*. Thus, for example, Forbes placed the Sheathbill between *Dromas* and *Thinocorus*,[3] and Gray between the Thinocoridæ and the Hæmatopodidæ,[4] while some even, as we are aware, referred the family to the Fowls and others to the Pigeons, Hartlaub being a representative of the former and Swainson of the latter class of writers, but as their views are not supported by a knowledge of the structure of the Sheathbills, we only mention their names here in order to show what different opinions naturalists will entertain when those opinions are based upon the external appearance of things.

Forbes has not been the only classifier to place *Chionis* near the Thinocorythidæ, for such a view is quite generally held; Eyton had that idea, and Sclater, already cited above, and Carus, and Sundevall,[5] and Wallace,[6] Lilljeborg,[7] and Fitzinger,[8] and of such an opinion Newton has said that "The little group of very curious birds, having no English name, of the genera *Thinocorys* and *Attagis*, which are peculiar to certain localities in South America and its islands, are by some systematists placed in the family Chionididæ and by others in a distinct family Thinocoridæ (more correctly Thinocorythidæ. They are undoubtedly limi-

[1] Parker, W. K.—On the Osteology of Gallinaceous Birds and Tinamous. Trans. Zoöl. Soc. Lond. 1866, V, 5, pp. 206 and 236.

[2] Reichenow, A.—Die Vögel der Zoologischen Gärten. I, II. Leipzig, 1882–1884.

[3] Forbes, W. A.—Collected Scientific Papers. 1885. p. 226.

[4] Gray, G. R.—Handlist of Genera and Species of Birds, I, II. 1869–1871.

[5] Sundevall, C. J.—Methodi Naturalis Avium Disponendarum Tentamen. Stockholm, 1872.

[6] Wallace, A. R.—Attempts at a Natural Arrangement of Birds. Ann. Nat. Hist. (2d ser.), XVIII, 1856, p. 193.

[7] Lilljeborg, W.—Outlines of a Systematic Review of the Class Birds. Proc. Zool. Soc., 1866, p. 5.

[8] Fitzinger, L. J.—Ueber des System und die Characteristik der natürlichen Familien der Vögel. Sitz. K. Akad. d. Wiss. Math.-Nat. Cl. XXI, p. 277 et seq. Vienna, 1856–65.

coline, though having much the aspect of Sand Grouse, but their precise position and rank remain at present uncertain."[1] (*Cf.* Garrod (*ut supra*) and Professor Parker (Trans. Zool. Soc. Lond. X, pp. 301 et seq.) To the number of those who correctly saw that the hæmatopine characters in *Chionis* predominated over its larine ones, we must not forget to add the worthy name of De Blainville's pupil L'Herminier,[2] who also saw something of the anatomy of the Sheathbill, and enough to convince him that the bird was more Oystercatcher than it was Gull; and no less distinguished a naturalist than M. Alph. Milne-Edwards[3] is of the same opinion. Support again came to this view in 1885 when Dr. Leonhard Stejneger published his scheme of classification of birds in the 'Standard Natural History' (Boston: Cassino & Co.). This writer divides his 'Order VII, the Grallæ' into five superfamilies, of which the first is the Chionoideæ, containing the two families (1) Chionidæ, and (2) Thinocoridæ. This superfamily is followed by the Scolopacoidæ, containing such families as the Glareolidæ, Dromadidæ, Charadriidæ and others. The Laridæ and their allies are in another and different order, viz., the Cecomorphæ, which practically agrees with Huxley's group of the same name. A few years after the appearance of this work there appeared the two sumptuous volumes on the structure and classification of the class Aves by Fürbringer,[4] and the following from his scheme gives his views upon the position of the Chionididæ: —

[1] Newton, A.—Art. 'Sheathbill.' Encycl. Brit. 9th Ed. Vol. XXI, p. 782. Newton in this article again invites attention to the unfortunate inaccuracies in the memoir of Doctors Kidder and Coues, and adds "The opinions of De Blainville and Dr. Reichenow are borne out by the observations of Mr. Eaton (Philos. Trans. CLXVIII, pp. 103-105), and no one knowing the habits of an Oystercatcher can read his remarks without seeing how nearly related the two forms are."

[2] L'Herminier, F. J.— Recherches sur l'appareil sternal des oiseaux, considéré sous le double rapport de l'ostéologie et de la myologie, etc. Mem. Soc. Linnéenne VI, p. 1. Paris, 1827—2d ed. Paris, 1828.

[3] Ann. Sc. Naturelles, ser. 6, XIII, art. 4, p. 247.

[4] Fürbringer, Max.—Untersuchungen zur Morphologie und Systematik der Vögel. Amsterdam and Jena, 1888, 30 plates.

O. CHARADRIORNITHES.	G. [s.] lat. Laro-Limicolæ	G. s. Charadrii	F. Charadriidæ.
			F. s. str. Glareolidæ.
			F. s. str. Dromadidæ.
			F. Chionididæ.
			F. Laridæ.
			F. Alcidæ.
			F. Thinocoridæ.
		G. Parræ	F. Parridæ.
		G. Otides	F. Œdicnemidæ.
			F. Otididæ.

Ægialornithes.

S. O. Charadriiformes.

It would seem that Professor Fürbringer saw more Gull than Plover in the Sheathbills, and had underestimated the significance of the characters presented on their part, inasmuch as he has only awarded them family rank.

The following year Cope[1] published his 'Synopsis of the Families of Vertebrata,' and in his arrangement of Aves sets forth the position of the Sheathbills as follows: —

SUPERORDER EURHIPIDURÆ.	ORDER	SUBORDER	FAMILIES
	Euornithes	Grallæ	Chionidæ.
			Thinocoridæ.
			Glareolidæ.
			Dromadidæ.
			Charadriidæ.
			Otididæ.
			Eurypygiidæ.
			Rhinochetidæ.
			Cariamidæ.
			Psophiidæ.
			Gruidæ.
			Rallidæ.

The Laridæ and their supposed allies he places in another suborder of the Euornithes, viz., the Cecomorphæ.

It will be seen that Cope's suborder Grallæ with its twelve families nearly corresponds to Stejneger's order Grallæ with its five superfamilies divided into its seventeen families. Cope here revived the opinions of those who believed that *Chionis* stood most nearly related to the 'Thinocoridæ,' and yet showing too that it was more Plover than Gull.

[1] Cope, E. D.—Amer. Nat. Vol. XXIII, No. 274. Oct. 1889, pp. 849-877.

In 1891 the present writer's memoir[1] on *Chionis minor* appeared, which has been referred to at the beginning of this article, and in the same year there was published the very admirable contribution to the classification of birds by Dr. Sharpe of the British Museum, one of the most useful papers now in the hands of systematic ornithologists.[2] With the exception of the present writer's article from the 'Journal of Anatomy,' Doctor Sharpe had before him at the time of his writing his 'Review,' all the schemes of classification of Aves mentioned in this paper, and no doubt many others not herein noticed; and in it he sets forth his own most able views upon the taxonomy of the class. The Sheathbills are thus placed :—

ORDER XVIII	SUBORDERS	FAMILIES
CHARADRIIFORMES	XXII. Dromades	Dromadidæ.
	XXIII. Chionides	Chionididæ.
	XXIV. Attagides	Attagidæ.
		Thinocoridæ.
	XXV. Charadrii	Hæmatopodidæ.
		Charadriidæ.
		Scolopacidæ.
	XXVI. Glareolæ	
	XXVII. Cursorii	
	XXVIII. Parræ	
	XXIX. Œdicnemi	
	XXX. Otides	

Further Dr. Sharpe places the Gulls in his Order XVII,—the Lariformes, containing the suborder Lari, and the two families Stercorariidæ and Laridæ, the latter containing the three subfamilies Larinæ, Sterninæ and Rhynchopinæ.

Previous to having seen Dr. Sharpe's classification the present writer had the following in manuscript to be used in his forthcoming work upon the osteology of birds.

[1] Shufeldt, R. W.—Contributions to the Comparative Osteology of Arctic and Subarctic Water-Birds, Part IX. Jour. Anat. and Phys. Vol. XXV, n. s. Vol. V, pt. IV, Art. V, Plates XI, XII, London, July, 1891, pp. 509-525. The entire part is devoted to the osteology of *C. minor*, and several figures are given of its skull, other figures of the bones of the skeleton having appeared in earlier parts of this series of memoirs.

[2] Sharpe, R. Bowdler.—A Review of Recent Attempts to Classify Birds; An Address delivered before the 2nd Intern. Ornith. Cong. at Budapest, May, 1891. Budapest, 1891.

SUBORDER	FAMILY	GENERA	SPECIES
CHIONIDES	Chionididæ	Chionarchus	C. minor.
		Chionis	C. alba.

Such a suborder would probably stand between my suborder Longipennes and the suborder Limicolæ, and there probably would be added to the Chionididæ, the three other families Dromadidæ, Attagidæ, and Thinocorythidæ. But with what I know of the osteology of *Chionis minor* and of *Hæmatopus*, and not having examined the entire structure of any of the three families first named, such a proposal must be considered wholly provisional. A knowledge of the entire morphology of all these forms is something very much to be desired.

OUR SCOTERS.

BY G. TRUMBULL.

IN an article under the above title printed in 'The Auk' of April, 1892, I called attention to numerous errors which had appeared concerning our representatives of the genus *Oidemia*. It was my intention at the time to continue the list of such errors in this second (and in a third) article, but I abandon the idea. Such a continuance would occupy altogether too much space. I give the facts which I have ascertained, with only occasional reference to the failures of former accounts.

Though difficult to conceive how some of the mistakes ever crept into print, it is easy to imagine how others occurred, viz., by the absence of fresh specimens; by compiling, with phraseologic variation, from earlier accounts of more or less credibility; by studying faulty pictures; by mistaking immaturity for maturity; by unhappy inferences; and by a desire, latent or active in us all, to appear at least a little wiser, a little more experienced than we really are.

As such common fowl as these have been so much and so long misrepresented, is it not reasonable to infer that numerous other species have been similarly treated, that there is a great deal of work for the reviser? Would it not be better for ornithologists to go back over the old road, before continuing their investigation of pastures new? The science has grown and will continue to grow chiefly from the examination of dried skins. This, though unfortunate, is practically unavoidable; but is it well that the results of such study should be confounded, as they commonly are, with facts obtained from the living creatures, or from their bodies intact as they lived? One is the study of birds, the other of their fleshless, discolored and distorted remains.

While noting the colors of the bills and feet, I have used — though I have not in every case adopted its terminology — Mr. Ridgway's 'Nomenclature of Colors.' Though the process by which his examples are printed has in many cases produced unhappy results, the volume is nevertheless a most useful medium of communication between writers and readers. No matter how familiar one may be with color and color terms, it is highly important, absolutely essential, to have at hand some such labeled series of tints for immediate comparison and future reference.

Before beginning with *deglandi* I must add to my former account of *americana* (Auk, Vol. IX, pp. 153-155), as I have secured a specimen the feet and bill of which are different from any I had seen prior to that writing.

Oidemia americana.

Young male.[1] Plumage — compared with previously described phases — similar to that of "young male in autumn," but lower surface of body whiter, or about as in "young female in spring," with the exception of being less positively spotted. Shape of bill about as in female, but beginning of 'hump' slightly indicated, viz., upper half of maxilla at base broader than in earlier youth: pushed outward at sides noticeably, the culmen, however, remaining as before. Color of bill black, paler in part, changing here and there to olive yellow or yellowish olive, the inside of the nostrils brighter and more yellow. Feet: outer side of tarsus and

[1] Killed Oct. 16, 1892.

outer side of outer toe dull dusky green; inner side of tarsus, both sides of inner and middle toes and inner side of outer and hind toes dark olive, changing to wax yellow; blackish shading at joints and elsewhere; the outer side of the hind toe almost uniformly blackish;[1] webs solidly black.

I am not sure just how long it takes for either of our Scoters to mature, and I will not hazard a guess. Features that we regard as indicative of perfection, may in reality be marks of decline. I feel pretty sure, however, that those drakes (of *deglandi*, the species now in hand) which have the brightest beaks, the most fully opened nostrils, the most cleanly white speculums, the whitest eyes surrounded by the whitest edgings and the largest eye-patches, represent very nearly or quite the fulness of maturity. And I am strongly inclined to believe that after the male and female have once reached maturity, there is little or no seasonal change: that when, for example, the male's plumage has become uniformly black, it remains black evermore; that the perfected colors of the bill and feet are fast colors.

Though we can determine very satisfactorily the comparative ages of specimens, by taking all parts into consideration, the size, as an indicator, is of little value. Several of the larger dimensions which I have noted were taken from birds not fully mature, while some of the smaller measurements are from undoubted adults.

In my former article I referred to two accounts which represent the bill of the *deglandi* drake as red, and simply red, — with the exception of the black portion. I could not imagine at the time how the error occurred. I have since discovered that the purple and orange, and even the white, of nearly mature males, sometimes change within three or four days after death, to an almost uniform purplish red. The descriptions referred to were doubtless taken from such stale specimens. I am careful to say "nearly mature" males, for in such birds only have I observed this change. The fully perfected colors seem to be at least a little more permanent.

[1] The term hind toe in my description of this and the other Scoters is intended to stand (when not otherwise explained) for both the toe itself and its broad membraneous flap.

Oidemia deglandi.

Frontal feathering — in most cases — reaching farther forward than the loral feathering. Sometimes the two extensions are equal, and sometimes (I have only observed it in the case of two young females) the loral feathering is advanced the merest trifle farther than the frontal. The frontal feathering generally terminates (sometimes acutely, sometimes obtusely) nearly on a line with the posterior edge of the nostril, sometimes reaching beyond, sometimes falling short.[1]

Speculum, composed of secondaries and ends of greater coverts, white. In immature birds the black (of the male) or brown (of the female) infringes a little at either end of the snowy area, showing also on the tips of the greater coverts, and narrowly at the ends of the secondaries; but in all the plumages of both the sexes this speculum is very conspicuously large and white. Its dimensions, while the wing is fully spread, are about as follows: length 5.50 to 6.50 inches; width at one end (by the primaries) 2.75, at the other end (by tertiaries) 1.75 to 2.00.

Under surface of wing: a mixture, varying considerably according to age: in the male, from brown, gray and white (young), to black, brown, gray and white (adult); in the female, brown, gray and white.

Eyes: those of all the females, and of the young males designated by letters A, B and C, deep brown.

Feet: outer and inner sides differing about as follows: in adult male, outer side of tarsus and outer side of outer toe one color; inner side of tarsus, inner side of all four toes and outer side of inner toe another color; both colors showing on outer side of middle toe. In nearly adult male: outer side of middle toe showing only outer color of tarsus; this color also showing more or less on outer side of inner toe. Though there are similar variations in the younger males and in the females, they are too faintly marked for comment. These colors of the feet are always, in both sexes, old and young, more or less broadly obscured at joints and elsewhere by black or blackish shading; the outer side of the hind toe (or outer side of its flap) almost or quite uniformly black or blackish. Webs uniform black. In the adult male the black of webs and shading of feet, inky black; in the female and young male, less intense or dull black.

Dimensions. — Male: length 21.00–22.75 inches; extent 37.25–41.50; wing 10.88–12.12. Female: length 19.62–20.75; extent 35.88–37.88; wing 10.62–11.12.

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[1] Former accounts are not wholly in accord about these extensions. I copy some of the characters attributed to the sub-genus *Melanitta* (or *Melanetta*) in which this species is placed. One authority says: "Feathers of side of bill extending obliquely forward from the angle of the mouth as far as those above." On another page of the work cited we read that the feathering extends "nearly as far forward on the side of the bill as above." Another and later author says: "Feathering of head advancing much farther forward on lores than on forehead"; but he gives us a drawing of the bill in which the frontal feathers are considerably in advance of the loral.

Weight. — Male: three pounds eight ounces to four pounds nine ounces. Female: two pounds twelve ounces to three pounds seven ounces.

(I have measured and weighed nearly a hundred specimens.)

ADULT MALE.

Plumage black, inclining a little to brown along the upper part of the sides[1]; a pure white patch below and behind the eye, beginning at front edge of eye and sweeping backward with an upward curve; the eye also completely edged with this white (see fig. 9); upper portions of plumage showing a faint iridescence which tends to green and plum color, the latter tint confined chiefly to the head and neck. Iris white. Bill (figs. 9 and 12): upper mandible immediately at base black, this black spreading forward over the knob and continued along the edge, sometimes as far as the nail, and sometimes disappearing brokenly before reaching it; sides pinkish purple or wine purple,[2] changed to orange next to the basal black; the nail reddish orange; from nail to knob white, the middle of the bill, in other words, being broadly white from the nail to the black between the nostrils; lower mandible with a patch of reddish orange at the end, including the nail, and back of this color white, the white meeting irregularly with basal black, which is extended in a somewhat varying degree toward the gonys. Feet: outer side wine purple (of a rather light shade and sometimes tending a little toward magenta); inner side coral red or orange-vermilion.[3]

ADULT FEMALE.[4]

Plumage chiefly dark brown, deepening on upper portions here and there to blackish brown, the brown of the lower surface of the body somewhat lighter and nearly uniform; side of head and the throat streakily and minutely flecked with dull whitish, most noticeably perhaps on the front of the lores, but nowhere forming a 'spot' or 'patch'; most of the neck uniformly brown; the feathers of jugulum, front of neck, scapular region, and sides of body, edged at their ends with

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[1] Though I have long believed that this brown wholly disappears, I have not yet found a specimen that did not show some of it. It is completely hidden when the wings are closed.

I have shot none of these adults in June and July, but in all the other months I have found them similar in appearance to those used in this description.

[2] This color would be better matched if some of the "heliotrope purple" (see Ridgway's plate VIII) were mixed with the "wine purple."

[3] I note the omission of a word from former description of these feet ('The Auk,' April, 1892, p. 157). For "side of tarsus and toes" read "outer side of tarsus and toes."

[4] Described from specimens killed Jan. 19 and April 22.

drab-gray. Bill (fig. 4): upper mandible grayish black, the nail striped lengthwise black and brownish yellow; a somewhat spotty and whitish mixture between nail and nostrils; a well defined and showy patch of deep rose pink or light geranium pink on the side (position of patch shown by fig. 7); lower mandible black, more or less whitish or light gray about the gonys, the nail like its fellow above. Feet: outer side vinaceous, greatly obscured by the black shading; inner side vinaceous rufous.

IMMATURE FEMALES.

A.[1] Almost uniformly blackish brown, the ends of the feathers a trifle lighter than other portions, but not noticeably so; the nape and upper part of head brownish black; an imperfect auricular patch formed by streaky flecks of white; a few scattering flecks of white on the breast. Bill (fig. 2) almost wholly grayish black, but lighter or gray in part, not the least suggestion of the adult female's pink patch; the shape of the bill also very different. Feet: outer side chocolate, inner side as in adult female.

B.[2] Differing from first young female as follows: somewhat lighter, less uniformly dark, the light ends of the feathers a little more pronounced, the front and side of the head flecked with brownish white, these flecks distributed scatteringly, not accumulate in auricular region, most numerous immediately about the bill.

C.[3] Plumage nearly as in maturity, but having a few flecks of white on the breast, and the light flecks of the head whiter and tending to blotchy accumulation here and there, particularly on the cheeks. Bill (fig. 3): color about as in females A and B; frontal feathering terminating as in the adult, or more acutely than in the younger birds. Color of feet not noted.

IMMATURE MALES.

A.[4] Similar to young female A, but lower surface of body somewhat lighter and grayish — in some specimens grayish brown, in others brownish gray — and with the white flecking of the head forming a positive auricular patch; there is also a faint, imperfectly defined loral spot or patch, sometimes pale grayish brown, sometimes more whitish. Upon closer inspection the loral marking is dull white, dotted with brown, the whole shading softly into the uniform brown about it. Bill (fig. 1) deep

[1] Described from specimens killed Oct. 21 and 22.

[2] Described from specimens killed Feb. 18 and 19.

[3] Described from specimens killed April 24.

[4] Described from specimens killed Oct. 17 and 21.

gray with black shading, the gray of the sides having a faint lavender cast. Feet similar to those of young females A and B, but lighter.

The descriptions of female A and male A represent the young during their first autumn, and this young male corresponds probably about as well with Herbert's '*bimaculata*' as any bird we shall ever find.

B.[1] Plumage very similar to adult female, with following exceptions: somewhat lighter on front of forehead and lores; lower surface of body decidedly whitish, — broadly so from jugulum to legs, — or white faintly spotted with brownish gray, shading to a more uniform, more brownish and deeper tint toward the tail; the rectrices with buff or pale brown tips. Bill: in shape about as in younger male; in color somewhat as in adult female, but light stripes of nail more reddish; pink at sides obscure, much darker, duller, less uniform. Feet as in young male A.

C.[2] Differing decidedly from young male B; upper parts both lighter and darker, presenting a much more variegated appearance; light brown and gray feathers with whitish edgings at their ends, contrasting strongly with others of brownish black; many of the pallid ends worn and ragged; greater part of head and neck darker, more blackish; the forehead and lores noticeably speckled with brownish white; tail more extensively "buff or pale brown" (looking dead, dry and ready for renewal, like many of the other feathers); lower surface of body less whitish, pale gray faintly spotted with grayish brown on the breast, and changing to an almost uniform grayish brown posteriorly; jugulum brownish black, broken into irregularly by the light color of the breast. Bill (fig. 6) a trifle more swollen; chiefly grayish black, lighter and more grayish in part; the nail streakily blackish and gray at its root; the pinkish color of the sides still more obscure, barely indicated. Feet about as before.

D.[3] Plumage with much more black, the black showing extensively over the upper parts (particularly about head, neck, tertiaries, primaries, and tail coverts), the bird being still more brown than black, however; the ends of the brownish feathers somewhat lighter than the rest, but nowhere noticeably so; front of forehead and lores minutely freckled with grayish buff; eye-patch beginning to appear, very short, continued only a very little behind the eye, and dull brownish white, the eye also edged, though not continuously, with this white; lower plumage almost uniform brown, deepening to black about jugulum and crissum. Iris nearly white. Bill (figs. 5 and 8) much more like the adult drake's — differing from it as follows: knob lifted less abruptly; nostrils much less open; basal black of maxilla broader, continued very positively all along the edges and spreading out in front at the sides of the nail; the white field less cleanly white and wholly separated from the purple at each side by a

[1] Described from specimens killed May 4 and 5.

[2] Described from specimens killed April 22 and May 4.

[3] Described from specimens killed May 3.

line of black[1]; black of lower mandible continued broadly along lateral edges to the front, the rami wholly black to within about .40 inch of the nail. Feet: outer side approaching unevenly the color of more mature male E; the inner side still as in the younger males.

E.[2] Plumage much more black than brown, the head, neck, wings, rump and tail coverts almost wholly black; lower surface of body much darker (than in D), more glossy and of a still more uniform brown; eye-patch considerably more extended, but not yet snowy white; nostrils more circular; iris cleanly white. Feet: outer side pinkish vinaceous, sometimes brighter or between rose pink and peach blossom pink; the inner side as in the adult male.

Other specimens, shot Oct. 23 and 27, are similar to these, but the lower surface of the body is of a lighter and less rich brown; the eye-patch more nearly perfect.

F.[3] Very near maturity; the black (of plumage) almost uniform; a few scapulars and interscapulars tipped with brown; lower surface of body inclining still to brown (blackish brown); eye-patch nearly or quite perfect; eye continuously edged with white; speculum not yet immaculate, but tips of greater coverts practically clean, and only a few of the secondaries showing duskiness. Bill (fig. 10) more cleanly bright than before, the black only partially separating the white from the side color and less obtrusive elsewhere. Feet: outer side pale (somewhat 'milky') wine-purple, inclining to a warmer or orange tint here and there; inner side rufous or between rufous and vinaceous rufous, and sometimes brighter, or of a slightly pinkish shade of coral red.

One of these nearly mature males, though so nearly all black, is conspicuously speckled with pale buff on the front of the head (or forehead, forepart of crown, and lores), and the knob of the bill (fig. 11) is also somewhat different from any of the others.

In the case of a number of drakes shot Oct. 18 and 21, which are still more fully perfected than the above, the lower surface of the body inclines to gray instead of brown, and is scatteringly flecked with dull white.

Among other interesting facts in this development is the turning light of certain portions while passing from one phase to another. For example: the plumage of the male, which is at first (A) almost uniformly blackish brown, does not mature as one might expect it to do, by growing steadily blacker and

[1] These narrow lines of black (which disappear as the bird matures) are mentioned in one of our ornithological works as characteristic of the bill of *O. fusca*, and as not found on the bill of *O. deglandi*.

[2] Described from specimens killed April 21 and May 3.

[3] Described from specimens killed April 21 and May 3 and 4.

blacker, or nearer and nearer in appearance to that of the adult, but passes through lighter, less uniform, more and more variegated stages (B and C), and even after steadying down to more simple, more readily comprehended methods of advance (D, E and F), certain portions continue to progress in the same manner as before. Note the description of those males "shot Oct. 23 and 27" which, though placed under E, are intermediate between E and F; the lower plumage, it will be seen, is lighter than in E proper, from which the birds are emerging, and lighter still than the phase F which they are entering. Mark also the conspicuously light forehead and lores of one of those nearly all black, nearly mature males F, and the scattering flecks of white on the still more fully perfected drakes "shot Oct. 18 and 21."

And not in the plumage alone is this uneven course pursued, the coloration of the male's feet is advanced in a similar manner. The outer side of the tarsi and toes, which are at first (A) chocolate color, change to what I describe under E as "between rose pink and peach blossom pink," prior to taking on the less light and less bright "wine purple" of maturity. Though I have used only the male bird in this illustration, the plumage of the female is developed in a like manner.

One reason, perhaps, why the bill of the adult female has always been described as wholly dusky, that no mention has been made of the pink patch at the side of the bill, etc., is that such specimens have been commonly regarded as immature males, whose beaks were just beginning to show the shape and color of maturity. Another reason (furnishing a better excuse) is that comparatively few fully adult birds are secured. A very large majority of the males and females that are shot are immature. The young are not only far more numerous, but they are decidedly less wary, and when hit are oftener killed.

That immaturity has been commonly mistaken for maturity is evinced by most of the descriptions. I copy a few suggestive bits from some of the attempts which have been made to describe the adult female's plumage. "Forehead and cheeks white; under the eye dull brownish; behind that, a large oval spot of white, . . . belly brownish white" (*Wilson*). "Two whitish spots on each side of the head, one near the base of the upper mandible, the other behind the eye" (*Audubon*). Other and

later writers describe it as similarly youthful in appearance; a "whitish patch on the side of the head behind the eye"; plumage of the body "pale grayish below," etc. One work describes it correctly enough as having practically "no white about the head," but includes a contradictory picture which shows very positively both the loral and auricular patches.

Though—with a single exception to which I allude under phase F—each figure in the accompanying plate is fairly representative of all the individuals of the phase to which it is ascribed, each is taken from a single bird: no one of them is in any degree a composite picture. They are life size, and I have done my utmost to render them accurate, using only fresh specimens as models.

As I wished to give shaded drawings of the bills of the adult female and immature male D, I have included a plain outline also of each for easier comparison with the other unshaded drawings. Some change is discernable in the shape of the bill, even within two or three days after the bird is shot, and before many months have elapsed its original form (like its original color) can only be guessed at. It is in the shape and size of the nostrils, perhaps, that the alteration is most marked. They are much less open, much smaller, terminate acutely at the front, are now far from circular in the adult and nearly adult male, and no longer elliptical in the female and young.

When the bill of a perfectly fresh specimen is measured, its width at widest part is greater than the distance from the nostril to the tip, while in an old skin the width is frequently less than the distance from nostril to tip, and the lateral outlines of the maxilla—which in life are strongly convex—have become (by uneven shrinkage) much more nearly parallel.

I have been greatly impressed, while studying these birds in and out of doors, by the differences between the color of the plumages when fresh and the appearance of the same plumages on dried skins six months or more later. I can now only speak positively about the skins of *deglandi* and *perspicillata*, but I presume that similar changes occur in *americana* and numerous other species. I am not referring to the black of the male which in time becomes somewhat less intense, less glossy, but to the brown plumages of the female and young. These

become less uniform, very decidedly lighter, and materially different in other respects, tending positively to tawny in some cases, to gray in others, where neither tawny nor gray was visible before; and the light edging at the ends of the feathers not only grows lighter, but is extended farther up upon the feather. In most cases, the beginning of such changes is discoverable by close comparison, when a skin is no more than a month old, and it is not too much to say that in a year's time very little or none of the original color is left. These post-mortem deviations seem to be more rapid and radical in such markedly transitional phases as immature and moulting male C, and certain plumages of *perspicillata* of which I will speak at another time.

Though the European and Asiatic White-winged Scoters (*fusca* and *stejnegeri*) are not "our" Scoters, a partial description of them may be useful here. I have never seen the foreign birds alive or in any degree fresh, but through the courtesy of Mr. Ridgway I have been able to carefully examine the skins representing them in the National Museum. That collection, though pretty well supplied with specimens of *stejnegeri*, unfortunately contains but five of *fusca*.

I have compared our New England specimens *of deglandi* with those taken in Alaska and find not the shadow of a difference between them.

The separation of the three species is thus far based almost wholly on the shape of the bill and the distance between front edge of feathering and nostrils. That *fusca*, *deglandi* and *stejnegeri* are at least a good deal alike in size, plumage and *general* proportions no one can doubt.

I will first describe the bill of *fusca* showing at the same time wherein it is similar to or dissimilar from those of the American and Asiatic species. When no mention is made of the female, my notes may be regarded as referring wholly to the adult or nearly adult male.

Oidemia fusca.

Distance between nostril and loral feathering considerably greater—at nearest point—than in *deglandi* or *stejnegeri* (not so wide, however, as length of nostril), this distinction applying also to the female. Maxilla

swollen noticeably at sides of base between corner of mouth and nostril, the bill differing in this respect from those of *deglandi* and *stejnegeri*. Though an approximation to this protuberance is sometimes observable in the other species, it is never so prominent and bunch-like. Lateral edges of maxilla somewhat more nearly parallel than in *deglandi*, and about as in *stejnegeri*. Basal part of culmen noticeably elevated, but not nearly so prominently as in *deglandi*, and incomparably less than in *stejnegeri*, rising very gradually and evenly over the nostrils. Anterior extremities of frontal and loral feathering (in both male and female) about equally advanced.[1]

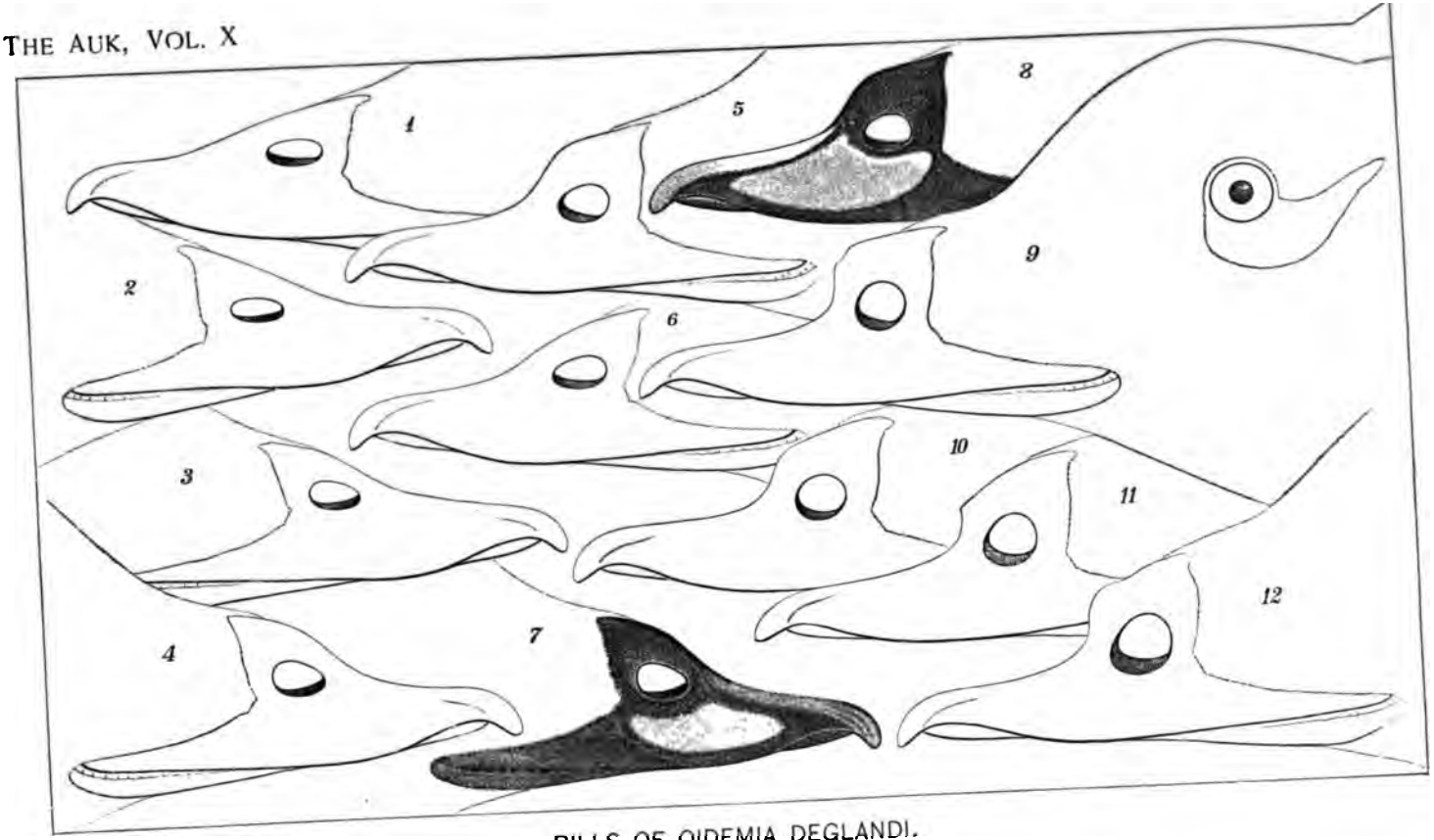
Oidemia stejnegeri.

Average distance between nostril and loral feathering,—at nearest point,—in both male and female, a trifle greater than in *deglandi*. Frontal feathering seldom, perhaps never, advanced so far forward as the loral. Knob enormously developed—over once and a half as high above nostrils as the highest knob of *deglandi*, its abruptly rising front decidedly concave, the top jutting forward suddenly and forming an overhanging, very conspicuous, bluntly pointed projection; the culmen somewhat higher at the top of this overhanging portion than at frontal feathers.

The knobs vary greatly even among drakes which at first sight are seemingly mature. Closer inspection shows us that when the front of the knob is not deeply concave, the bird is not fully developed, the basal black is continued far forward, shows more or less all along the lateral edges, and in positive lines running from the black in front of the nostrils to the sides of the nail. (See fig. 8 in which similar lines are indicated for *deglandi*.) On the other hand, when the front face of the knob is deeply concave and its top juts conspicuously to the front, the bill is broadly light, the black lines are absent (or very faintly and brokenly indicated), the black is pushed but a short distance in front of the nostrils, and shows but slightly along the lateral edges. Probably none of the color is at all as it looked in life, but the black marking is distinct enough fully to support what I have said.

Though the bill passes through innumerable shapes while developing from that of early youth, the culminal line of which is similar to that of fig. 1, none of its late phases closely resemble any of those exhibited by *deglandi*.

[1] I am unable to judge in the case of these bills in regard to the original amount of black and its distribution, as they have been artificially colored. Though the artist who did the work is peculiarly accurate, he was forced to obtain his knowledge of the coloration from very unsatisfactory pictures and descriptions.



BILLS OF OIDEMIA DEGLANDI.

(The males facing to the left, the females to the right.)

OBSERVATIONS ON THE BIRDS OF JAMAICA, WEST INDIES.

BY W. E. D. SCOTT.

II. A LIST OF THE BIRDS RECORDED FROM THE ISLAND, WITH ANNOTATIONS.

(*Continued from Vol. IX, p. 375.*)

147. **Hadrostomus niger** (*Gmel.*). BLACK SHRIKE. JUDY. MOUNTAIN-DICK.—Said to be common above three thousand feet in the mountain districts. Not observed during my stay on the island.

148. **Tyrannus dominicensis** (*Gmel.*). GRAY KINGBIRD.—Apparently a migratory species, leaving the island during the winter months. The majority pass through the island, but many remain to breed.

149. **Pitangus caudifasciatus** (*D'Orb.*). COMMON PETCHARY. PIPIRI.—Very abundant at most points which were visited. This was particularly noticeable in the regions near the sea level. Above fifteen hundred feet elevation, at least in the winter, they were not nearly so common, but Gosse ('Birds of Jamaica,' p. 178) says that he has observed them at Bluefields Peaks. At Priestman's River, on February 14, these birds were generally building nests, and the breeding season was fairly begun.

150. **Myiarchus validus** (*Cab.*). TOM-FOOL.—This does not seem to be a very common species, and I did not meet with it, except on two occasions, below twelve hundred feet above the sea. At Stony Hill it was more common than at any other point visited, but even here it was among the rarer birds. In general habits and appearance it reminds one very much of *Myiarchus crinitus*.

151. **Myiarchus stolidus** (*Gosse*). LITTLE TOM-FOOL.—Commoner than *M. validus*, and much more generally distributed. Though met with more commonly at Stony Hill than at other points, yet a few were noted at all places visited, though in the immediate vicinity of the sea I did not find them. Gosse does not seem to have been acquainted with *M. validus*, and speaks of this species only in a general way. According to him it breeds in hollow stumps, about the last of June or in early July, as young were taken from such a location, grown so as to be recognized, in August ('Birds of Jamaica,' pp. 168–169).

152. **Blacicus barbirostris** (*Swains.*). FLAT-BILL.—This was the commonest Flycatcher observed at Stony Hill, and was an abundant bird at that point. At Boston, near Priestman's River, though seen several times, it was not nearly so abundant as at the higher altitude of Stony Hill. The breeding season had not begun, nor was it imminent, when I left the island.

153. **Contopus pallidus** (*Gosse*). BUFF-WINGED FLAT-BILL.—This appears to be another species more common above than below a thousand feet above the sea. At Stony Hill I saw them frequently and procured a fine series of individuals, but at the sea level in the vicinity of Priestman's River they were not observed, while on the foot-hills a mile or more back from the salt water a few, two or three, were taken during the two months spent in this region. Its habits seem to resemble closely those of *Contopus virens.*

154. **Elainea cotta** (*Gosse*).—A rare species at points that I visited. On December 9, at Stony Hill, a female (9567) was taken. It was feeding on low bushes near the ground and acted much more like a *Dendroica* than a Flycatcher. On January 8 one was taken near the house at Boston, and on February 13 a male (11,120) and a female (11,121) were taken, evidently mated. On dissection these birds showed that the breeding season was about six weeks distant. These four are all the records made during my stay.

155. **Elainea fallax** (*Scl.*) Said to be very rare. Not met with at the points visited.

156. **Corvus jamaicensis** (*Gmel.*). GABBLING CROW. JABBERING CROW.—These birds were not uncommon at a point known as Egg Hill, about three miles inland from Priestman's River and about one thousand feet in altitude. Here, in a practically unsettled wilderness, I procured some six or eight individuals at various times, and this was the only point where I observed them. For an excellent account in much detail, as to habits and so forth, the reader is referred to Gosse ('Birds of Jamaica,' pp. 209–217).

The Black-headed Jay (*Cyanocorax pileatus*) (Temm.) has been recorded from Jamaica by Gosse ('Birds of Jamaica,' p. 208), but its occurrence must have been accidental.

157. **Dolichonyx oryzivorus** (*Linn.*). BOBOLINK. BUTTERBIRD. OCTOBER PINK. PINK.—A very abundant migrant in October and April. Does not winter.

158. **Nesopsar nigerrimus** (*Osburn*).—Not met with. This species, from all I have been able to learn, is local in its distribution, and nowhere common.

159. **Icterus icterus** (*Linn.*). TROUPIAL.—Cited by authors as an introduced species. I did not meet with it, and it apparently does not occur on the island in a wild state at present.

160. **Icterus leucopteryx** (*Wagl.*). BANANA-BIRD.—A common resident species and generally distributed. The plumage of the sexes cannot be distinguished when the birds are adult. No. 9729, adult female, Stony Hill, Dec. 15, 1890, and nos. 10,703 and 10,704, both adult females, Priestman's River, January 28, 1891, do not differ in appearance in any way from adult males in highest plumage. Other instances might be cited. But young birds and birds probably up to the second year are not nearly as highly colored as adult birds. This seems to have nothing to do with

sex. At Boston the birds were quite common, and were mated before I left that point. Though not powerful singers like *Icterus galbula*, the birds have a very pretty song and the females seem to be as musical as the males. From many birds dissected I should think they would breed about the last of April or the first part of May.

161. **Quiscalus crassirostris** (*Swains*). TINKLING GRACKLE. BARBADOES BLACKBIRD. SHINING-EYES. — This bird was not observed in the vicinity of Kingston or at Stony Hill, but at Port Antonio and Priestman's River, they were not at all uncommon. They are gregarious, though the parties that I saw rarely consisted of more than six or eight individuals. Aside from the tinkling, melodious, call note they have a series of notes, that I have frequently heard given, that may fairly be called a song, and a very pretty, though not varied, one.

162. **Sicalis flaveola jamaicæ** (*Sharpe*). This is stated by Gosse to have been a common species, but apparently of very local distribution at the eastern part of the island. I was unable in my limited stay to visit the points indicated, and refer the reader for greater detail to Gosse ('Birds of Jamaica,' pp. 245-247).

163. **Ammodramus savannarum** (*Gmel.*). TICHICRO. GRASS PINK. SAVANNA-BIRD.—This was a common species in the grass fields about the Constant Springs Hotel, and just back of that locality. Here they were abundant, but as my series was collected in December, 1890, and just after the close of the breeding season, I have no proper material for a close comparison with the North American subspecies. All the birds I procured were moulting or in a very worn plumage.

Mr. Taylor tells me that he does not know of any other point on the island where the birds occur. There were apparently suitable localities at many points near Port Antonio and Priestman's River, but careful search failed to reveal their presence.

164. **Habia ludoviciana** (*Linn.*). ROSE-BREASTED GROSBEAK.— This is included on the authority of Mr. Hill (Gosse, 'Birds of Jamaica,' p. 259.)

165. **Euetheia bicolor** (*Linn.*). This was a rather common species at Stony Hill, and had only just finished breeding on my arrival at that point. I did not see the birds about Constant Springs nor in the immediate vicinity of Kingston. At Priestman's River they were uncommon, not more than a dozen being seen and taken during my stay.

166. **Euetheia olivacea** (*Gmel.*). (*Spermophila adoxa* Gosse, 'Birds of Jamaica,' p. 253.) YELLOW-FACED GRASSQUIT.— An abundant species, and of general distribution. It is perhaps most common at the lower altitudes.

In the vicinity of Priestman's River birds were observed carrying material for nest building early in January. On February 3 at this point an individual (No. 10,878) was taken which proved on dissection to be a female. In external appearance it was like the average male bird of the species, having the black of the head and throat intense and the orange

face marks very bright. Many females taken show this condition to some degree, but this is the only one in a large series indistinguishable from the adult male.

167. **Loxigilla violacea** (*Linn.*). COTTON-TREE SPARROW. BLACK BULLFINCH. COFFEE-BIRD.—A common species at the points visited, but it seemed more abundant at the lower altitudes than at Stony Hill and points higher in the mountains. In a large series before me there are many females quite as brightly colored as the more intense males, and indistinguishable from that sex in its highest plumage by any external features of color or appearance. Three females taken on February 16 were about to lay the first egg. The only song I heard from these birds was a series of rather weak notes, four or five in number, the last given with rather more emphasis than the others.

168. **Loxigilla anoxantha** (*Gosse*). YELLOW-BACKED FINCH.—This was a rather common bird at most points visited, though I did not see it at all during my stay at Constant Springs. At Stony Hill it was fairly common, but only a few were observed or taken at Priestman's River. It appears to be a species more common in the hills and higher altitudes than in the lowlands near the sea. I made no notes as to its nesting but Gosse ('Birds of Jamaica,' p. 248) speaks of finding a nest in June. On January 17 on the hills above Priestman's River, altitude 1000 feet, I took a young female (10,440) that apparently had not been long from the nest. Another (10,624) taken near the same locality on January 24 was still younger.

169. **Euphonia jamaica** (*Linn.*). BLUE QUIT.—At all points which I visited this was one of the most abundant and conspicuous of the fruit-eating birds. At Stony Hill they were gregarious and were feeding on the mango fruit and the sour sop. I also saw them in large companies in the vicinity of Constant Springs, and perhaps more abundantly at Priestman's River. They were equally common at all altitudes I visited.

Gosse ('Birds of Jamaica,' pp. 238–242) gives so detailed an account of the nesting, etc., of this bird that the reader is referred to the work cited.

170. **Spindalis nigricephala** (*Jameson*). MOUNTAIN BULLFINCH. ORANGE-BIRD. BANANA-BIRD. CASHEW-BIRD.—Another gregarious, fruit-eating species, and one of the more common and conspicuous birds of the island. At Stony Hill they were seen almost daily in parties of from three to ten, and more rarely a single individual or a pair. At Priestman's River they were abundant and found in similar small companies in the vicinity of any fruit-bearing trees, particularly mango, sour sop, and the like. On January 14 at Priestman's River individuals of both sexes were observed carrying material for nest building.

171. **Piranga erythromelas** (*Vieill*). SCARLET TANAGER.—This is apparently a rare migrant, passing through the island in March. There are no recent records and the reader is referred to Gosse ('Birds of Jamaica,' p. 235) for greater detail.

172. **Progne dominicensis** (*Gmel.*). GREAT BLUE SWALLOW.—Migrant and summer resident, a few wintering. Observed only once during my stay. This was at Priestman's River on February 5 when large numbers of birds, unquestionably this species, though none were obtained, appeared in company with many *Hemiprocne zonaris*. For a full account see Gosse ('Birds of Jamaica,' pp. 69–72).

173. **Petrochelidon fulva** (*Vieill.*) CUBAN CLIFF SWALLOW. CAVE SWALLOW.—An abundant resident species, especially near the coast, and not so common in the interior of the island. The caves, before referred to in this series of articles, in the faces of the cliffs along the shore, were favorite roosting and resting places for this species, and probably the birds bred here later in the year. Hundreds could be seen, about sunset, retiring to these caves at Priestman's River.

174. **Chelidon erythrogaster** (*Bodd.*). BARN SWALLOW.—Not observed. Included by A. and E. Newton ('Handbook Jamaica,' 1881, p. 107).

175. **Tachycineta euchrysea** (*Gosse*). GOLDEN SWALLOW.—This species seems of very local distribution. During the months spent on the island it was not even noted. From all that can be learned it is confined to the higher altitudes where it is resident and only common locally.

176. **Clivicola riparia** (*Linn.*). BANK SWALLOW. Not observed. Recorded by A. and E. Newton ('Handbook of Jamaica,' 1881, p. 107).

(*To be concluded.*)

SUPPLEMENTARY REMARKS ON THE GENUS *PITTA*.

BY LEONHARD STEJNEGER.

MR. D. G. ELLIOT'S recent paper in 'The Auk' (*antea*, pp. 51–52) on the Genus *Pitta* Vieillot, suggests a few remarks.

The earliest publication of the name *Pitta* is either in the 'Analyse' or in the fourth volume of the 'Nouveau Dictionnaire d'Histoire Naturelle,' pp. 355–358. Both publications bear the same apparent date, viz., 1816, but internal evidence would

indicate that the 'Analyse' was published later.[1] The diagnosis in the 'Dictionnaire' is also much fuller, and several more species are mentioned than those figured by Buffon in the 'Planches Enluminées.' And here is another point, viz., that Vieillot's genus, as well as the French name 'Brève,' is not taken from Buffon, properly speaking, but from Montbeillard (Hist. Nat. Ois. III, 1775, p. 412).[2] In this are mentioned four species only, viz., Pl. Enl. Nos. 89, 257, and 258 (*but not at all No. 355!*) and Edwards' pl. 324.[3] The latter is *Pitta brachyurus* (LINN.), being in fact the basis of the name, and the type of *Eucichla* is not mentioned at all. This simplifies the elimination process greatly, the result being, as Mr. Elliot has already decided, that the name *Pitta* belongs to the short-tailed group and can only belong to it! But as for the type of it, I think Sclater is right in giving it as *P. brachyura*. Were we to take the first species mentioned by Vieillot, the type would be *Pitta cyanura* VIEILL. which Mr. Elliot has just decided is the type of *Eucichla!* Besides, no code of nomenclature provides for the selection of the type by taking the first species. The A. O. U. Code distinctly provides for the process of elimination; and if that be applied I think it will be found that *P. brachyura*, mentioned both by Montbeillard and by Vieillot, must stand as *the* type.

The mention of the name *P. brachyura* raises another question, viz., that of the specific appellation of these birds. Sclater (Cat. Bds. Br. Mus., XIV) gets very easily around the matter by

[1] Quite a number of names *not* in the first four volumes of the 'Dictionnaire' are found in the 'Analyse,' making it probable that they were invented later, for instance, *Acridotheres*, *Alectrurus*, *Aramus*, *Ægialites*, *Anerportes*. The case of *Alectrurus* is particularly interesting, for on p. 68 of the 'Analyse' the original *Gallita* was not changed, probably by an oversight, while in the text proper it was changed to *Alectrurus*, but too late to get the new name into the 'Dictionnaire.' True, Vieillot in the latter under Astrurine cendrée refers to the 'Analyse,' but that does not prove that it was published or even printed at the time, especially as no page is quoted.

[2] I quote this edition, because it is evidently the one Vieillot refers to in the 'Dictionnaire' (l. c.) as follows: "Monbeillard les [i.e. les brèves] a isolées d'après les différences de conformation extérieure par lesquelles, dit-il, la nature elle-même les a distinguées." As a matter of fact Montbeillard (l. c.) is the creator of the genus ("Je n'ai pu m'empêcher de séparer ces oiseaux d'avec les merles, voyant les différences," etc.,) while Vieillot only supplied the Latinized name.

[3] Sclater, consequently, is correct in saying that *all* belong to the short-tailed group.

simply querying the identification of Buffon's plates. But the figures in question are too well made to justify such a proceeding. There can be no doubt that Edwards' pl. 324 faithfully reproduces the common Indian species. Sclater admits this by adopting the name, but he adds *Turdus coronatus* MÜLLER to the synonyms, though with a query. This is unnecessary, for nothing can be more certain than the fact that Pl. Enl. 258 represents a bird with the whole head, including the throat, black. With the exception of the absence of red on the belly and under tail-coverts the latter plate agrees exactly with Temminck's *P. irena*. The fact that the red is also missing in Pl. Enl. 257, otherwise indistinguishable from Temminck's *P. cyanoptera*, makes it extremely probable that the absence of the red is due to the same cause, either to age, the red being very pale and dull in the young, or possibly to the manner of preservation of the skins, or to fading. I may mention that I have before me an undoubted adult bird of the latter in which the red is almost entirely gone (U. S. Nat. Mus. no. 14,456; U. S. Expl. Exp.). The difficulty arising from Buffon's giving the habitat of no. 258 as "Bengale," while *P. irena* inhabits the island of Timor, is easily overcome by the fact that Brisson, in describing the same specimen, says that it came from the Moluccas, and as a matter of fact, Sclater does not query the pertinancy of Brisson's description. Oates (Bds. Br. Ind., II, 1890, p. 392) seems to accept the identification of Pl. Enl. no. 257, but he gets away from Müller's name *P. moluccensis*, because it "conveys an erroneous impression of this bird's habitat." Apart from the unsound principle involved in allowing the rejection of a name even on such a ground, there is another reason for disagreeing with him, viz., that it appears that those older authors did not always restrict the name Moluccan Islands to only those which are so called to-day.

Finally, Mr. Elliot in his paper alludes to the genus '*Coracopitta*.' The fate of the name of this genus is strange indeed! I have been accused of having "showered" new names upon the ornithological public in my portion of the bird volume of the 'Standard Natural History,' yet my accusers do not find it worth their while to go to that book for names when they need new ones; they would rather add to the 'shower'! In the volume

alluded to, p. 466 (1885), I substituted *Mellopitta* for *Melanipitta*, preoccupied, being careful not to deviate too far from the original name, in order to minimize the change. Sclater, three years later (Cat. Bds. Br. Mus., XIV, p. 449) adds his *Coracopitta* to the list of synonyms. I at once called the attention of ornithologists to this fact (Auk, 1889, p. 79) and Count Salvadori did the same in the Ibis (1890, p. 124), but apparently to no purpose, for in 1892 Mr. Sharpe (Cat. Bds. Br. Mus., XVII, p. 7, foot-note) proposed the amended name of *Coracocichla* alleging *Coracopitta* to be preoccupied, because Bonaparte, in 1854, *ought* to have written *Coracopitta* for *Corapitta!* Surely this 'shower' of names could easily have been avoided, while I will assert that the changes which I undertook in the 'Standard Natural History' were unavoidable and necessary under the A. O. U. Code of Nomenclature. A further study of that volume might prevent other unnecessary changes in the future. Thus one may find *Atrichornis* substituted for *Atrichia*, preoccupied, though still employed in 1890 in the thirteenth volume of the 'Catalogue of Birds in the British Museum'; also the name *Alopochen* for *Chenalopex*, preoccupied (not in Waterhouse's Index Gen. Av.), but these are by no means the only ones.

VIEILLOT'S 'ANALYSE' AND BUFFON'S 'BRÈVE.'

BY D. G. ELLIOT.

By the courtesy of Dr. Stejneger I am placed in possession of proofs of his article on the genus *Pitta*, published in this number of 'The Auk,' and am therefore enabled to discuss some points in his paper, without being obliged to wait three months for the opportunity to state my views in this journal.

With the greater portion of Dr. Stejneger's paper I am in complete accord, and as regards the proper names to be borne by the Pittas mentioned by him I have for many years contended that those given in his article were the only correct ones, in spite

of the adverse criticism and practice of my ornithological friends in the Old World, and in my forthcoming monograph of the family the species will appear under the names as given by Dr. Stejneger.

But on one or two points I find myself unable to agree with my friend's views, and although perhaps they may not be of very especial importance so far as the Pittas are concerned, yet as the conclusion Dr. Stejneger has reached would seem to antedate the publication of the 'Analyse' by the 'Nouveau Dictionnaire,' and so seriously affect many genera and species published in the former work, it is perhaps as well to consider the value of the evidence our author relies upon to maintain his position. His proofs, why the 'Analyse' was the last published, are that quite a number of names contained in that work are *not* found in the first four volumes of the 'Nouveau Dictionnaire'; consequently the latter must have been issued first, and although under the name *Asturia cinerea*, Vol. III, a reference is made to the 'Analyse,' yet as no page is given, this is an additional reason that the 'Dictionnaire' was published first. These are, I believe, all the proofs presented by Dr. Stejneger, and on which he rests his case.

Let us see, therefore, how the evidence obtained from a careful investigation of the work in question affects his position. The 'Analyse' is dated 1816. With no evidence to the contrary we must acknowledge that it was published during that year. The 'Nouveau Dictionnaire' is in a great measure a recapitulation of the 1803 edition, somewhat amplified, but the revision and addition of new matter, so far as Vieillot is concerned, is done hastily and imperfectly. The fact that the thirty-six volumes were issued in four years shows how rapid was the publication — Vols. I–VI in 1816, Vols. VII–XVIII and XXV in 1817, Vols. XIX–XXIV and XXVI–XXVIII in 1818, and Vols. XXIX–XXXVI in 1819, — or, in 1816 one volume every two months, in 1817 more than one a month, in 1818 one in a little over a month, and in 1819 a little over one every two months. (It is possible that the date of Vol. XXV (1817) is a typographical error.) If, therefore, the revision of these volumes was accomplished anywhere near the dates of their publication, it need cause no surprise that omissions occur in them. Dr. Stejneger's argument affects only the

first six volumes published in 1816, because I gather nowhere in his article that he denies that the 'Analyse' was issued in that year.

Now, in regard to the first citation of Dr. Stejneger, that the omission of names from the 'Dictionnaire' which appear in the 'Analyse' is a proof that the former antedates the latter, it must be of course admitted that if these omissions occur only in the volumes published in 1816, and never in the later volumes, after, even as Dr. Stejneger will acknowledge, the 'Analyse' was published, his case would be a very strong one indeed; but what are the facts? I have looked up in the 'Dictionnaire' every name given by Vieillot on pages 68, 69, and 70 of the 'Analyse,' with the following result. Of new species there are sixteen, of which thirteen are mentioned in the 'Dictionnaire,' but unfortunately for Dr. Stejneger's argument, the volumes in which all of the absent ones should appear were published *after* 1816. These species are *Musophaga cristata*, *Tyrannus cinereus* and *Phœnicopterus parvus*. Of the "nouveaux noms" taken from the Greek there are ninety-one mentioned. Of these *twenty* are not given in the 'Dictionnaire,' although *thirteen* of the missing twenty should have appeared in the volumes issued *after* 1816. It would therefore seem very clear that because any name is omitted from the 'Dictionnaire' that is contained in the 'Analyse,' is no evidence whatever that the former antedates the latter, for if it were for the first six volumes issued in 1816, it would be equally so for the rest, and then it might be claimed that the 'Analyse' was not published until after 1819!

Of all the names given on pages 68, 69, and 70 of the 'Analyse,' to only *four* is any reference made in the 'Dictionnaire,' viz., *Asturia cinerea*, Vol. III, 1816, *Ortygodes variegata*, Vol. XXIV, 1818, *Pica rufiventris* and *Physeta*, both in Vol. XXVI, 1818, the last three mentioned two years after the appearance of the 'Analyse'; but with none of them is any page of Vieillot's pamphlet cited, which proves, if it proves anything, that he was not in the habit of giving the page. This really is the fact, pages hardly ever being cited from any work, but the numeration of the *plates* often, and therefore the absence of page number cannot possibly be advanced as an argument to prove that the first six volumes of the 'Dictionnaire' were published before

the 'Analyse,' but that on the contrary in the one instance in Vol. III he referred to his work in the same way as he did in Vols. XXIV and XXVI, as actually published and in existence, which Dr. Stejneger acknowledges to be a fact at the date of the last two volumes. It will thus be seen that the reasons given by Dr. Stejneger for his belief that the 'Analyse' appeared after the first six volumes of the 'Dictionnaire' fail to support his view, but that the evidence tends directly against it, and more strongly to confirm our belief that the 'Analyse' was a prior publication.

The second point in which I take issue with our author is that the species of Vieillot's genus *Pitta* and those of the French name Brève are not taken from Buffon (although Vieillot expressly states they are), but from Montbeillard, and he quotes the 'Histoire Naturelle des Oiseaux,' Vol. III, 1775, p. 412—an edition of eight volumes 1770–1781. In this volume four species are given under Brève as stated by Dr. Stejneger, and one as 'L'Azurin,' which is *Pitta guiana* P. L. S. Müller, the *Brève de la Guiane* of plate 355 of the 'Planches Enluminées.'

The standard edition of Buffon's Hist. Nat. Ois., commonly known as the 'Planches Enluminées,' is in ten volumes published from 1770–1786; and this is the work usually understood when any reference is made to Buffon concerning birds, and the one generally quoted. Why Dr. Stejneger should deem it necessary to select something else, and so endeavor to make Vieillot, when he designates in the 'Analyse' "Buffon's Brèves" as the species for his genus *Pitta*, include any not mentioned in the work above referred to, seems strange, as so little is to be gained by it anyway. The word *Brève* is a French term universally applied to the species of *Pitta*, the same as *Colubri* or *Oiseaux-mouches* is to Hummingbirds, and includes all the species comprised in the family. That Vieillot regarded 'L'Azurin' as a *Pitta* (no matter what Montbeillard considered it) is shown in the 'Dictionnaire,' Vol. IV, p. 356, where he calls it 'La Brève Azurine,' and if Dr. Stejneger considers that the 'Analyse' was published after the 'Dictionnaire,' then this species must be included in Vieillot's genus *Pitta*, because it is in both the edition quoted by him as well as in plate 355 of the standard edition, and therefore his volume would contain five Pittas against four in the work from which I quote, in either case making *Pitta* a composite genus containing both long- and short-tailed species.

What the type of *Pitta* may be is of no consequence whatever at the present day; but by no process of elimination that I know, either of the A. O. U., or any other Code, can a genus which has been proposed to include four short-tailed birds (as is the case with Dr. Stejneger) or three (as is the case with Volume IV from which I quote of the 'Planches Enluminées'), all generically alike, be narrowed down to compel the selection of one species only, when no genera have been accepted for the reception of any of the others. Under such circumstances it is usual, I contend, (no especial species having been indicated by the author of the genus) to select the one first mentioned, which in both works cited is Pl. 89, Brève des Philippines, *Pitta sordida* P. L. S. Müller, as given in my paper on the genus *Pitta*, and (if he is unwilling to accept this species) I can see no reason whatever why Dr. Stejneger should ignore plates 257 and 258, the *Pitta moluccensis* Müller and *Pitta coronata* Müller (generically the same as Edwards's species on plate 324 of his work), both given in the volume he cites, in order to pick out a bird not figured by Buffon at all, and not even mentioned in the standard work from which I have quoted.

As to Montbeillard being the author of the volume from which Dr. Stejneger quotes, he is equally so in the one to which I have made reference, and his name in conjunction with Buffon is given as co-author of the 'Planches Enluminées,' and it was natural for Vieillot to mention him, but we should by no manner of means imagine that by so doing he denied to Buffon any authorship in the work; but, by giving in the 'Analyse' Buffon's Brèves as the species he intended to be contained in his genus *Pitta*, he meant those included in the 'Planches Enluminées' and there figured, and not Edwards's species of which Buffon makes no mention in his completed edition.

In conclusion I would point out the fact that, in the 'Dictionnaire,' Vieillot refers to the complete edition of the 'Histoire Naturelle des Oiseaux,' 1770–1786, and enumerates only as found in Buffon's work the four species represented on plates 89, 257, 258 and 355, the last being Vieillot's *Brève azurine*, and although he gives in his list with others not in the 'Planches Enluminées,' the *Brève de Ceylon* as figured on plate 324 of Edwards's 'Birds,' he nowhere refers to it as belonging to the species he included in his genus *Pitta*, viz. Buffon's Brèves.

RECENT LITERATURE.

Keeler on the 'Evolution of the Colors of North American Land Birds.'[1] — Mr. Keeler's book is audacious and in some respects unique. At many points the author stalks with a bold tread where more experienced investigators would hardly dare to step. In this work an attempt is made to give a detailed explanation of how and why the land birds of North America have acquired their tints and markings. The subject chosen is thus one that might well be selected for the crowning work of a long life of special research instead of the maiden effort of one who has still his spurs to win in the field of zoölogical investigation. Mr. Keeler gives evidence of possessing a highly speculative turn of mind and considerable originality of thought. He also shows that he has made himself fairly conversant with the literature relating to the general subject of evolution, and that this is his chief preparation for the work in hand, it being painfully evident that he is seriously handicapped in his undertaking by lack of experience and familiarity with exotic birds.

Before passing to a detailed notice of his work, we will transcribe the opening paragraph of his preface: "The present paper has been written more with the hope of stimulating thought and inciting research in a new and as yet almost untrodden field of ornithological inquiry, than with the expectation of reaching definite results. The subject is as yet too new and difficult to be reduced to even the semblance of an exact science, and accordingly all the views here set forth are more or less provisional and tentative. I have constantly proceeded upon the assumption that a poor theory is better than no theory, provided it be not considered as final, since it affords an opening wedge for the further study of a subject. Accordingly many of the views here set forth are hardly to be considered as more than guesses, and it is expected that future study will serve to show their fallacy. If they lead to further study, however, and to more exact and comprehensive work by others, I shall be glad to see them overturned and their places filled by more worthy hypotheses."

The attitude here assumed is commendably modest, but it is hardly borne out by the general tenor of what follows. We cannot agree with him, however, that "a poor theory is better than no theory," even if it is put forth tentatively; we believe it is much better, and far safer for the best interests of science, to confess ignorance on abstruse points than to set forth views that "are hardly to be considered as more than guesses,"—in other words, hap-hazard conjectures, which may or may not have an element of probability, according to the fitness of the guesser to

[1] Evolution of the Colors | of | North American Land Birds. | By | Charles A. Keeler. | San Francisco: | California Academy of Sciences. | January, 1893. 8vo, pp. xii + 361. pll. xix. = Occasional Papers of the California Academy of Sciences, III.

express an opinion on the question at issue, or his proneness to give rein to his fancy on slight provocation. It is obvious that a *wrong* theory is worse than no theory; for to the lay reader or half-informed student who is unable to discriminate properly between the probable and the improbable, it is sure to be positively misleading. Pure speculation is the bane of science; it misguides the uninitiated and disgusts the well-informed. Many writers more gifted with imagination than with knowledge have contributed largely to romance under the guise of science, and especially is this the case in the particular field which includes such topics as Mr. Keeler here treats.

We do not wish this to be construed, however, as a wholesale condemnation of Mr. Keeler, or of theorizing in general; on the contrary we find much to commend in Mr. Keeler, and recognize the absolute necessity of hypotheses in scientific research; we wish merely to emphasize the fact that there is much natural history romancing which has wide currency as 'science.' A fair acquaintance with current theories respecting a few special phases of the subject of evolution, a merely superficial knowledge of the underlying principles, and a vast ignorance of the facts, of biology at large, is too apt to form the equipment and the incentive of some of our boldest theorists in the field of speculative biology, for whom nature has no secrets beyond their power to explain. This, indeed, is our estimate of much of the speculative writings of Poulton, Romanes, Weismann, and many other writers who have of late been so prolific of explanations of the abstruse things in nature, whom Mr. Keeler so freely quotes, and whom he has evidently taken as his models. He has, however, shown in general less discretion and more recklessness in his conclusions and generalizations.

Mr. Keeler's work consists of two parts, an 'Introduction,' occupying the first 132 pages, the remainder being devoted to 'The Colors of North American Birds' (pp. 132–336). Then follows a bibliography, explanations of plates, and an excellent index. The first part treats of general questions, such as 'The Inheritance of Acquired Characters' (pp. 2–50), 'Variation and Natural Selection' (pp. 50–63), 'Laws conditioning Evolution' (pp. 64–80), 'Sexual Selection' (pp. 80–102), 'The Nature of Species' (pp. 103–109), and 'Isolation as a Factor in the Evolution of Species' (pp. 110–132).

As Mr. Keeler says, in view of the disagreement between the leading writers of the different schools, "it is quite impossible to undertake any general scientific investigation in the field of evolution without a tolerable survey of the whole ground." As he further says: "There is hardly one of the important doctrines concerning which a consensus of scientific opinion has been attained. To be sure, all maintain that Darwinism or natural selection is a factor in evolution, but while some hold it to be the only factor, and all-sufficient in the creation of species, others believe it to be a very minor agency, and relegate it to the post of inspector-general of the army of life. With regard to sexual selection the

same diversity of opinion prevails, one school advocating sexual selection as the sole agent in producing the brilliant colors and varied plumes of male birds, etc., the other extreme asserting that sexual selection as a factor in evolution is a myth. Still greater is the diversity of opinion and more intense the feeling in regard to that momentous question which is at present agitating the troubled sea of scientific thought—the transmission of acquired characters."

Concerning all of these leading questions Mr. Keeler spreads before his readers the pros and cons of the argument as presented by leading champions, giving a concise history and impartial summary of the contesting theories. Mr. Keeler also now and then attempts to weigh the evidence brought forward by the different opposing advocates, but for the most part maintains a position of neutrality or judicial reserve to such an extent that it is sometimes difficult to see which side of the case he favors, till we reach his final summing up of the subject.

In discussing the inheritance of acquired characters he appears to allow great weight to the supposed distinction between the inheritance of a habit or the modification of a structure and the inheritance merely of a "constitutional tendency" to a given habit or to a given variation—a distinction we confess too occult for our comprehension. At the close of his discussion of heredity he says: "From all this we may come to a provisional conclusion that acquired characters are transmissible. We are justified in using this assumption as a working hypothesis, and in feeling confident that future investigation will place it upon a footing where it is beyond the possibility of refutation." For this concession we are duly grateful!

Mr. Keeler admits himself to be a strong convert to the theory of sexual selection as he interprets it, and that it affords "a tolerably complete explanation of secondary sexual characters in birds," after considering the evidence, pro and con, at considerable length. We are quite unable, however, to see the evidence as it appears to him; or at least to accept the principle of sexual selection as he applies it in the second part of his work; in other words, that the secondary sexual characters among birds, or among any other animals, are due to any great extent to voluntary selection on the part of the female. The subject is of course too broad to admit of discussion in the present connection.

Mr. Keeler, we are glad to see, gives the cold shoulder to Mr. Romanes's rather baseless theory of 'Physiological Selection,' which has already received many well-merited thrusts, since it is primarily based upon an assumption not only impossible to prove in the slightest degree, but at the same time seemingly of the utmost improbability.

In the two hundred and odd pages devoted to 'The Colors of North American Birds' there is much that is suggestive and worthy of commendation, mixed with a great deal that is weak and unphilosophical, which on the whole leaves a feeling of regret and disappointment, when compared with the able presentation of the subjects treated in the first third of

the work under review. In his account of 'Modes of Plumage Changes' is an erroneous interpretation of the change of color in the young Arizona Hooded Oriole, the conclusion being reached that the "transition in this species is by an addition of pigment without moult." With part of the same material in hand that formed the basis of Mr. Keeler's conclusion, and much more of similar character representing a large number of other species, it is evident that he has misunderstood the facts in the case,—namely, that a common mottled transition stage of plumage has been mistaken for an actual change of color without moult It is evident that this mottled phase of plumage, occurring in a very large number of species, is a permanent one for the time being, varying greatly in different individuals of the same age, and not a gradual color change without moult. This, of course, is not proof that there is never any change of color without moult, the only satisfactory proof of which, however, must obviously be based on observation of the living bird for a sufficient period to determine the nature of the change of color. Under 'General Principles of Color in Birds,' we are at a loss to see why the pigment should be considered any more a "product of waste" than the feathers themselves, or other portions of the integument. Mr. Keeler calls attention to "a curious parallelism between the colors" in species of *Pipilo* and *Setophaga* (p. 147), "which may be only a coincidence or may be a matter of profound significance." This being the case, how about similar parallelisms between these genera on the one hand and others in Australia India, Africa, and South America? Or the cases of almost exact parallelism in pattern of coloration, and often even in color, of wholly unrelated genera in widely separated parts of the world, which occur over and over again in a considerable number of very distinct styles of coloration? The *Pipilo* style, the *Junco* style, the *Sturnella* style, the *Icterus* style, the *Mimus* style, and so on, occur over and over again among Old World birds; certain African Weaverbirds repeat the red shoulder spots of *Agelaius*, etc., while in other cases this same marking is repeated in blue, white, or yellow.

There is space to notice very few of the striking generalizations that occur so frequently in the second third of the book, but a few may be cited in illustration of the general criticism we are forced to make upon Part II as a whole. From reading pages 159–161 one would infer that the feather first grew to its proper size and form and was then decorated by the subsequent deposit of pigment, for we read: "Pigment is a definite chemical substance which travels through the various branches of the feather, advancing farthest and most rapidly along the lines of least resistance and accumulating in masses where the resistence is greatest. Now the pigment cells must reach the various parts of the feather by way of the shaft, and we should *a priori* expect to find that the resistance would be least right down the shaft. It might spread out a very short distance on the barbs, but the main tendency would be toward the tip." Again he says (p. 177): "It is evident that along the line of demarcation

of two colors the pigments are apt to get confused as to which is their proper route, and hence both come upon the same feather [in 'hybrid' feathers] by accident, as it were." Is it possible that Mr. Keeler is unaware that the tip of the feather forms first, and receives its pigment and markings, whatever they may be, before the middle and lower parts of the feather have passed beyond the gelatinous stage of the as yet not fully developed feather? This being the case it is needless to discuss "lines of least resistance" and "the development of pigment in mass when an obstacle is encountered," as illustrated by our author in the unhappy simile of a "panic-stricken mob"! Neither is it necessary to consider the various classifications and generalizations based on this erroneous departure,[1] that fill so many of the subsequent pages. Alas, the fewer facts for a nicely spun theory the better!

At page 181 he gives a list of markings not known to him to occur among birds; but if he had broadened his survey to other regions of the world he would have had no trouble in finding nearly all of them. Even our own Woodcock would have given him an example of "the top of the head barred," while numerous species of Old World Cuckoos and Kingfishers would have furnished still finer illustrations. And so on with most of the other unknown markings.

As one example, out of many, of slipshod generalization take the following from p. 196: "I would suggest that there is great probability that the habits of birds have been more or less determined by their colors"; as for example, in a group of olive green or gray birds "those which formed the habit of living in trees would survive, while those frequenting the ground, being more conspicuous, would perish," as would in like manner "brown birds which got up among trees" instead of remaining on the ground! The very next bird mentioned (p. 197) is the Brown Creeper, which has developed a "special protective resemblance" to the bark of trees.

[1] Even the most rudimentary knowledge of the method of feather growth, such for instance as could be gained from Burmeister's note on the subject in Nitzsch's 'Pterylographie,' would have saved our author this humiliating mistake. Also if his general knowledge of feather structure had been a little more extended he would have saved himself the trouble of describing as 'A Supposed New Feather Structure' (*Zoe*, III, Oct. 1892, p. 257), the simple thread-like form of feather known since the time of Nitzsch as the *filoplume*, and mentioned in so readily accessible a work as Coues's 'Key to North American Birds' (p. 186). These filoplumes are present probably in all birds, and over large portions of the feathered tracts, instead of possibly proving, as Mr. Keeler suggests, "to be a generic character" in our Orioles. An inspection of plucked fowls in markets will furnish an instructive illustration of the general character of filoplumes, for which Mr. Keeler has so recently proposed the name *Pseudopilum*. In this connection we will venture to suggest that had our author devoted some time to a general study of pterylæ in connection with special color areas he would have been rewarded by the discovery of many suggestive coincidences, and also that use of the microscope would have thrown much light upon the general subject of feather structure in its relation to coloration.

There is a large amount of nonsense, sparingly mixed with a few good suggestions, on the subject of 'Recognition Marks' and allied topics, for which our author is responsible only so far as to follow the hasty suggestions of various predecessors and of adding more of like character. "With the Crows and Blackbirds," he says (p. 203), "which habitually consort in flocks, it is quite possible that means of recognition has been at least one factor in the production of black color." But it happens that Crows and Blackbirds (*i.e.*, Icteridæ) are not the only black birds in the world, which occur in a great number of families in various countries; nor are they all gregarious, nor are more than a small part of the gregarious birds black. It is apparently more than hinted (p. 152) that the concealed white color on the neck feathers of *Corvus cryptoleucus* may be due to a tendency to albinism, which "is common among Crows"! Does this statement coincide with the facts in the case, in comparing Crows with Thrushes, or with Sparrows, for example, or with birds in general?

"In the Passenger Pigeon (*Ectopistes migratorius*) the tail markings are highly complex. . . . The necessity for directive recognition marks would be especially necessary in a species moving in such large flocks, from which individuals or small parties would constantly get astray. It may be that the complex pattern on the tail feathers was evolved first as a discriminative mark, for except in size, the species might easily have been confused with the Mourning Dove (*Zenaidura macroura*) which has the tail marked with a simple irregular subterminal band of dusky" (p. 205). Did our author stop to reflect to what extent these "highly complex" tail marks are visible, or to what extent they would aid as recognition marks in comparison with the Pigeons highly distinctive call-note, or in what way they could possibly serve as "directive recognition marks" to stragglers that had wandered from the flock? These "highly complex" tail markings are found only at the extreme base of the tail, within the area normally concealed by the coverts, *and are therefore not visible under any ordinary conditions.* Hence we wonder whether Mr. Keeler took the trouble to examine even a museum specimen of the bird, or whether he depended upon the description which he copies from Mr. Ridgway's 'Manual,' which does not happen to state the particular portion of the tail thus marked. These are but a sample of the author's methods of reasoning and far-fetched theories. There is also evidence of much haste or carelessness in the preparation of many parts of the work, including slips in nomenclature, and contradictory statements or conflicting generalizations, sometimes following each other on almost consecutive pages.

While there is much that is valuable in the book, and many points that are well taken, Part II especially is largely vitiated by unsound reasoning, by misapprehension of facts, or by lack of general information on special points. It is very easy to speculate and surmise, even to the extent of giving the reader either one of several hypotheses, all perhaps equally worthless, for the explanation of a given fact, — easier perhaps than to

confess ignorance, which is after all what the whole proceeding plainly shows.

Plate IV furnishes a very striking and interesting illustration of head-markings, with arrows arranged to show how one form of marking may have been derived from another, and how all may be reduced to five general types. As, however, the birds representing the successive stages of modification belong usually to distantly related genera, or even families, and as the relationships, as our author says in the text (p. 187) "are not supposed to be genetic," it may be asked, Of what practical utility is this elaborate generalization? Or what light does it throw upon the real method of evolution of these various patterns?

Great stress is laid upon the "primitive streaked plumage," and upon the streaked feather as a primitive type. While this may be true in a restricted sense, and form a test of grade in a group of closely allied species, it fails when taken in a general sense, as for instance in comparing Pigeons and Tinamous (genus *Tinamus*) as groups with Thrushes and Sparrows, or many 'low' groups with higher ones.

While Mr. Keeler's book is highly original in both conception and execution, and exceedingly novel and interesting in its pictorial illustrations, it displays, we are pained to say, much misdirected energy; and unless the lay reader and the novice keep in mind the opening paragraph of the preface, they are liable to acquire a large amount of misinformation.—J. A. A.

Beddard's 'Animal Coloration.'[1]—The present volume, says the author, is addressed to persons having no special knowledge of zoölogy, and its aim is "to furnish a general notion of the facts and theories relating to Animal Coloration.' "It contains hardly anything novel, but professes to give some account of the principal phenomena of coloration exhibited by animals." It is thus mainly a review of previous theories and the facts on which they are based, with a running critical commentary representing the views of the author respecting the many disputed points at issue. It consists of six chapters, having the following headings: I. 'Introductory.—The Principal Facts of Animal Coloration' (pp. 1–41); II. 'Coloration affected by the Environment' (pp. 42–82); III. 'Protective Coloration' (pp. 83–147); IV. 'Warning Coloration' (pp. 148–192); V. 'Protective Mimicry' (pp. 193–252); VI. 'Sexual Coloration' (pp. 253–282).

Mr. Beddard distinguishes 'Colour' from 'Coloration,' the former relating to the actual tints, the latter to the arrangement or pattern of these tints. Colors are due either solely to the presence of definite pigments,

[1] Animal Coloration | an Account of | The Principal Facts and Theories | relating to the | Colors and Markings of Animals. | By | Frank E. Beddard, M. A. Oxon., F. R. S. E., etc., | Prosector to the Zoological Society of London, Lecturer on Biology at Guy's Hospital | With Four Colored Plates; and Woodcuts in the Text | [Monogram] London: Swan, Sonnenschein & Co. | New York: Macmillan & Co. | 1892. —8vo, pp. viii, 288.

or in part to optical effects, due to mechanical structure, as in the case of iridescent feathers, scales, etc., by which the light rays are scattered, diffracted, or unequally refracted; in such cases, however, a background of dark pigment is necessary for the display of the metallic lustre. A variety of pigments has been found and chemically analysed, by which it is found that the same color, even in allied forms, is not always due to the same pigment. "The brown colour of birds is chiefly due not to one pigment, but to two apparently distinct pigments, which give different chemical reactions." The green color of the Turacou is due to an entirely different pigment from that which causes the green color in Parrots. Thus the same effect is often produced by quite different pigments. Again, differently colored animals have the same pigment, as in the case of the very differently colored sexes in the Parrots of the genus *Eclectus*, the color difference being due to a difference in the structure of the feathers, the males in these Parrots being colored green and the females red.

Color is believed to be "a normal product of organization, entirely independent of utility"; yet there is good evidence that " 'coloration' bears often a distinct relation to the needs of the animal," and may therefore be modified by 'natural selection,' using this term in its broadest sense. On the other hand, it is quite evident that coloration is not always in harmony with the mode of life of the animal, while often 'complex markings' are so placed as to be of no possible use to the animal possessing them. It is hence frequently impossible to advance any reasonable hypothesis to account for their presence. Hence Mr. Beddard freely admits that the "action of natural selection" in producing color changes is limited. He also calls attention to the comparative constancy of color and color markings throughout whole genera and even families, and also that the same plan of coloration is often repeated in very distantly related groups. This fact is sometimes explained on the ground of mimicry, but in many cases such an explanation is beyond supposition.

In some instances there is apparently some relation between coloration and structure of the underlying parts of the organism, but the cases where this is obvious, or where some better explanation may not be suggested, are very few: the agreement is, we believe, more a matter of chance coincidence than one of any deeper relation.

In discussing changes of color during the lifetime of the individual, Mr. Beddard points out various flaws in the reasoning of Weismann and Poulton on the subject, but leaves much unsaid that may be urged in opposition to their views. Lack of space, however, forbids entering upon the subject in this connection.

Mr. Beddard, we are glad to see, is willing to grant that the influence of an animal's surroundings may exercise a direct influence upon its coloration without the intervention of the agency of 'natural selection.' Under this head are very properly considered the seasonal changes of many Arctic animals.

The subject of 'Protective Coloration' is discussed at considerable engtth, and for the most part with commendable conservatism, in comparison with the credulous spirit in which the subject is often handled. Many previously alleged cases of protective coloration are considered as not proven, or as *sub judice*, or as more satisfactorily explainable in other ways. Furthermore, he does not consider that protective resemblances between animals and their surroundings have all been produced by natural selection, citing many instances in which the assimilation of color to the natural surroundings is pretty obviously due to food,—as notably among the various marine animals which feed upon the brightly colored sea weeds among which they live. He says (p. 132): "Considering the resistant nature of many pigmentary substances, vegetable as well as animal, it is at least probable that a large number of cases of color resemblance, often set down to the action of natural selection, may be due, as in the case of *Eunice*, to the simple excretion by the skin of these pigments which have been taken in as food. Until more is known about the chemical composition of animal pigments, *it would be rash to adopt an elaborate explanation when the more simple one would be sufficient.*" If the course recommended in the passage we have italicised in the above quotation were generally followed in similar cases, much worthless speculation would be saved, greatly to the advantage of real scientific progress. Again Mr. Beddard observes: "At every step, in fact, in the study of animal coloration, we are met with closed doors, which can only be unlocked by keys furnished by an intimate chemical and physiological knowledge such as we do not at present possess" (p. 140).

The subject of 'Warning Colors' is discussed at considerable length and with great candor. Here Mr. Beddard's remark that "The field of hypotheses has no limits," and that what we need is "more study," applies with special force. After reviewing the evidence, pro and con, he appears to arrive at the conclusion that 'warning colors,' particularly in insects and the lower forms of life generally, have not been evolved for the express purpose of warning, but rather that they are concomitant with inedibility — "that the brilliant colors (*i. e.*, the abundant secretion of pigment) have caused the inedibility of the species, rather than that the inedibility has necessitated the production of bright color as an advertisement" (p. 173). The theory of warning colors is, of course, that they have been especially evolved to give notice of some disagreeable quality. The skunk (genus *Mephitis*) has come to be a classic illustration of the theory. But Mr. Beddard points out that in South America skunks are not free from enemies, being the prey, and sometimes the chief food, of many rapacious birds; and those readers of 'The Auk' who have had much acquaintance with our Great Horned Owl can give corroborative testimony in respect to those of North America.

Closely related to the theory of 'warning colors' is that of 'Protective Mimicry,' to which it is supposed to furnish support. This theory origi-

nated with Mr. H. W. Bates, the well-known English naturalist who spent so many years on the Amazon in South America. It was suggested by his finding that a certain group of butterflies (Heliconidæ), conspicuously banded with yellow and black, were provided with certain glands which secrete a nauseating fluid, supposed to render them unpalatable to birds. In the same situations were also found similarly colored butterflies belonging to another family (Pieridæ), which so closely resembled the others in shape and markings as to be easily mistaken for them, but which were unprovided with the scent-secreting glands, and were thus unprotected from attacks from birds. This resemblance it was thought was brought about by natural selection for the protection of the edible butterflies through the birds mistaking them for the inedible kind. Other cases of mimicry among a great variety of insects have since been pointed out, and the theory of protective mimicry has secured many adherents. A close scrutiny of these alleged cases, however, shows that in many instances, and to a considerable extent, 'protection fails to protect.' Mr. Beddard gives the evidence in favor of mimicry at some length, interspersed with some rebutting comment, and then discusses the objections to the theory. The discussion is too long to be followed here, and the objections too numerous even for recapitulation. One is that resemblances occur between animals inhabiting widely separated areas which are so close that if the same forms were found together one would be considered as a case of mimicry of the other. Again resemblances occur between distantly related forms found in the same country in which neither has any special means of protection, and hence the 'mimicry' is without any protective effect. Again, cases occur where the resemblance is a positive disadvantage to the mimicker. Many special cases, as of flies mimicking bees, spiders mimicking ants, etc., are dealt with separately, and the objections in each case seem fairly conclusive. In commenting upon the rarity of even alleged cases of mimicry among mammals, Mr. Beddard considers that this fact is not remarkable, when we consider how few the total number of mammals is when compared with insects, and that out of the vast assemblage of the latter "it would be strange if there were not many cases of accidental resemblance; and there are many such" (p. 237).

In 'Chapter VI. Sexual Coloration,' Mr. Beddard appears to wholly reject Mr. Darwin's much admired theory of 'Sexual Selection,' and quotes at length Mr. Wallace's *reductio ad absurdum*, which, as illustrating the view of an ultra natural selectionist, may well be here transcribed: "Natural selection . . . . acts perpetually and on an enormous scale in weeding out the 'unfit' at every stage of existence, and preserving only those which are in all respects the very best. . . . Now this extremely rigid action of natural selection must render any attempt to select mere ornament utterly nugatory, unless the most ornamented always coincide with 'the fittest' in every other respect; while if they do so coincide, then any selection of ornament is altogether superfluous. If the most brightly coloured and fullest plumaged males are *not* the most healthy and vig-

orous, have *not* the best instincts for the proper construction aud concealment of the nest, and for the care and protection of the young, they are certainly not the fittest, and will not survive, or be the parents of survivors. If, on the other hand, there *is* generally this correlation — if, as has been here argued, ornament is the natural product and direct outcome of superabundant health and vigour, then no other mode of selection is needed to account for the presence of such ornament. The action of natural selection does not indeed disprove the existence of female selection of ornament as ornament, but it renders it entirely ineffective; and as the direct evidence for any such female selection is almost *nil*, while the objections to it are certainly weighty, there can be no longer any reason for upholding a theory which was provisionally useful in calling attention to a most curious and suggestive body of facts, but which is now no longer tenable."[1]

Mr. Beddard adds: "In short, we find that the secondary sexual characters of animals are dependent upon the germ glands themselves; and that the sexual diversity of animals is also associated with differences of disposition and habit. There is a fundamental difference between males and females, based upon the actual difference of sex, which generally finds an expression in outward unlikeness. These superficial differences may also be partly due to the different mode of life led by the two sexes. We meet with them in animals which cannot be moved by choice or æsthetic preference; but it is also true that they are most highly developed in the higher animals, where such choice is at least conceivable; the mammal, however, forms a very important exception to this statement" (p. 282).

A fine vein of irony occasionally appears in Mr. Beddard's comments upon alleged cases of mimicry, and especially of alleged instances of sexual selection, as in respect to the mating and 'love dances' of spiders. But on the whole his criticisms are suggestive rather than aggressive.

We have long been of the opinion that most of the cases of supposed 'warning colors,' of mimicry, and sexual selection were to be much more satisfactorily accounted for on other grounds than by the special theories that have of late proved so popular with superficial writers, and apparently so fascinating to the still less discerning public, and we are glad to welcome so healthy an antidote to this mild phase of scientific lunacy as Mr. Beddard's book on 'Animal Coloration.' — J. A. A.

Our Hawks and Owls in their Relation to Agriculture. — 'Bulletin No. 3' of the Ornithological Division of the U. S. Department of Agriculture,[2]

[1] Wallace, Darwinism, p. 295.

[2] The Hawks and Owls of the United States in their Relation to Agriculture. Prepared under the Direction of Dr. C. Hart Merriam, Ornithologist, by A. K. Fisher M.D., Assistant Ornithologist. Published by Authority of the Secretary of Agriculture. Washington: Government Printing Office, 1893.—8vo, pp. 210, with 26 colored plates = U. S. Department of Agriculture, Division of Ornithology and Mammalogy, Bulletin No. 3.

prepared under the direction of Dr. C. Hart Merriam, Chief of the Division, by Dr. A. K. Fisher, Assistant Ornithologist, is devoted to "a report on the Hawks and Owls of the United States, with special reference to the economic status of the various species." To quote from Dr. Merriam's letter of transmittal: "The statements herein contained respecting the food of the various hawks and owls are based on the critical examination, by scientific experts, of the actual contents of about 2700 stomachs of these birds, and consequently may be fairly regarded as a truthful showing of the normal food of each species. The result proves that a class of birds commonly looked upon as enemies to the farmer, and indiscriminately destroyed whenever occasion offers, really rank among his best friends, and with few exceptions should be preserved and encouraged to take up their abode in the neighborhood of his home. Only six of the 73 species and subspecies of hawks and owls of the United States are injurious. Of these, three are so extremely rare they need hardly be considered, and another (the Fish Hawk) is only indirectly injurious, leaving but two (the Sharp-shinned and Cooper's Hawks) that really need be taken into account as enemies to agriculture. Omitting the six species that feed largely on poultry and game, 2212 stomachs were examined, of which 56 per cent. contained mice and other small mammals, 27 per cent. insects, and only 3½ per cent. poultry or game birds." "In view of these facts," adds Dr. Merriam, "the folly of offering bounties for the destruction of hawks and owls, as has been done by several States, becomes apparent, and the importance of an accurate knowledge of the economic status of our common birds and mammals is overwhelmingly demonstrated."

Dr. Fisher, in his introduction, recounts these generalizations more in detail, and adds: "One of the counties of Pennsylvania paid out in a year over $5000 for scalps of birds of prey. . . . There is no doubt that this State and others which have passed similar laws have made a serious mistake; for it is indisputable that the opinion about hawks and owls, so widespread and popular, is not well founded; and it is the purpose of this bulletin to set forth the results of many years' observations with the view of dispelling the popular illusion regarding the destructiveness of hawks and owls as a class." He adds that "Owls are among the most beneficial of birds, inflicting very little damage upon the poulterer and conferring vast benefits upon the farmer"; and that "all Hawks, with possibly one or two exceptions, are to some extent beneficial to the farmer."

The various species of rapacious birds are divided into four classes: (1) Those wholly beneficial or wholly harmless. These number six species: Rough-legged Hawk, Squirrel Hawk, Swallow-tailed Kite, White-tailed Kite, Mississippi Kite, and Everglade Kite. (2) Those chiefly beneficial. These include the greater number of the most widely dispersed and best known species of both Hawks and Owls. (3) Those in which the beneficial and harmful qualities seem to balance each other. In this class some species may be beneficial in one part of the country and injuri-

ous in another, as the Great Horned Owl, etc., which in the East preys upon game and poultry, and in parts of the West is highly useful in destroying the superabundant hares and other rodent pests. (4) Those positively harmful, as the two species of Hawks already named, and the Goshawk, Duck Hawk, and Gyrfalcons. The Fish Hawk also comes into this category as it "eats fish, and fish only, and is often a nuisance to the fish culturist. . . . If its fine presence and magnificent flight do not sufficiently plead in its favor, then it must be put on the black list."

The species and subspecies are each taken up in detail, their habitats stated, their food habits explained, followed by a brief description of the species, with a table showing the results of the examination of stomachs. A very good colored plate is given of all the more important or prominent species, thus affording easy means of identification to the farmer or others interested. As a sort of badge of character, the various species are represented as holding in their talons or beaks specimens of their characteristic food, as reptiles, insects, mice, spermophiles, squirrels, birds or poultry, as the case may be. The plates were drawn by Mr. J. L. Ridgway, and their reproduction has been effected with varying degrees of success, some of them being excellent and others far from faultless, either in coloration or artistic effect.

From an economic standpoint this long-expected report should be of the highest importance, and should do much to enlighten not only the farmers but the public at large that a bird is not necessarily to be black-listed and hunted to extermination simply because he is clothed in the garb of a hawk or an owl. It will, however, take much reiteration and intelligent missionary work to allay the unreasoning prejudice against hawks and owls, which from time immemorial has everywhere been inculcated, because, forsooth, there are a few black-legs in the guild. The utility of systematic research concerning economic problems in natural history by experts under government auspices is again abundantly demonstrated in this valuable report upon a long misunderstood but important subject, the relation of birds of prey to agriculture.—J. A. A.

Bolles's 'Chronicles.'—Mr. Bolles's 'At the North of Bearcamp Water'[1] is a companion volume to his 'Land of the Lingering Snow' (see Auk, IX, p. 62), being the second volume of the 'Chronicles of a Stroller,' this time in the New Hampshire highlands. The book, like its predecessor, is very little given to moralizing about what the author sees, and is perhaps for this all the more novel and refreshing. From the naturalists' standpoint Mr. Bolles's record is not less graphic and minute, and quite as readable and more 'scientifically' accurate than the volumes which have

[1] At the North of Bearcamp | Water | Chronicles of a Stroller in | New England | from July to December. | By | Frank Bolles | author of "Land of the Lingering Snow" | [Vignette] | Boston and New York. | Houghton, Mifflin and Company. | The Riverside Press, Cambridge | 1893. 12mo. pp. 297.

made Thoreau such a favorite with many readers, though perhaps less fascinating to sentimental admirers of nature. In fact, the two authors hold little in common, beyond love of mountain, field and woodland, and their non-human denizens.

Mr. Bolles is sometimes a little abrupt in his transitions — perhaps studiedly so — and his sentences are frequently short and jerky, but his language is concise and graphic, and his style generally crisp and pleasing. His frequent allusions to birds and mammals show that he has had either good coaching or is himself a naturalist, at home in the technique of science, and in the use of traps and the gun, as well as the field-glass, as is so well shown in the chapter entitled 'Trapping Gnomes.' Nearly all of the twenty-one articles that make up the book contain passing allusions to birds, botany and mammals, while several of them are distinctively ornithological, as, for instance, 'The Dead Tree's Day' and 'Migration'; while 'Chocorua in November,' 'Among the Wind-swept Lakes,' and 'In the Paugus Woods,' etc., give glimpses of the late autumn and winter bird life of a region an ornithologist rarely sees at these bleak seasons.—J.A.A.

Foster's Bibliography of the Ornithological Writings of George N. Lawrence.[1] — Mr. Foster has done ornithologists an excellent service in his carefully prepared and exceedingly detailed bibliography of the writings of Mr. George N. Lawrence. It is prepared on the same plan as Professor Goode's bibliography of the writings of the late Professor Baird, which forms No. 1 of this series of bibliographies. A short biographical sketch of Mr. Lawrence precedes the list of his works, and an excellent portrait of him forms the frontispiece of the brochure. Mr. Lawrence's first formal paper was published in 1846, describing a new species of Brant (*Bernicla nigricans*); the last here noted appeared in January, 1891. The total number of titles is 121. His writings relate mostly to the birds of the West Indies, Mexico, Central and South America. The titles are arranged chronologically, and besides the full title and place of publication a synopsis of each paper is presented so far as to give in tabular form the names of the species mentioned, the locality cited when not sufficiently implied in the title of the paper, and the page where mention of the species is made. The chronological list is followed by an alphabetical list of the new species and subspecies, giving the habitat of the type specimen, and a cross-reference to the chronological list. These number 323! An alphabetical general index follows, which, with the chronological list, enables one readily to find any species ever mentioned by Mr. Lawrence in his writings. Pages ix to xi contain a list of the 19 species, and the single genus of birds named in honor of Mr. Lawrence.

This bibliography well attests the great activity of Mr. Lawrence in ornithological work during a period of nearly half a century.—J. A. A.

[1] Bulletin of the United States National Museum. No. 40. Bibliographies of American Naturalists: IV. The Published Writings of George Newbold Lawrence, 1844-1891. By L. S. Foster. Washington: Government Printing Office, 1892. 8vo, pp. xi, 124, frontispiece, portrait of Mr. Lawrence.

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GENERAL NOTES.

Alle alle in Virginia.—In a recent letter Captain Crumb of Cobb's Island, Virginia, informs me that a Dovekie (*Alle alle*) was taken there this winter, this being its second known occurrence at that place.—EDWARD J. BROWN, *Washington, D. C.*

The American Woodcock (*Philohela minor*) in Great Numbers at Mount Pleasant, South Carolina.—A cold wave accompanied by a gale struck the coast of South Carolina on the morning of December 27, 1892. There was plenty of snow, ice and sleet on the ground the whole day. In fact the weather moderated very little the whole week. The thermometer registered as low as 18° to 22° during the week.

On the morning of December 27 thousands of Woodcock were shot in the village of Mount Pleasant. They were everywhere—in the yards, stables, streets, and even piazzas. Everybody was out after the birds, and every one had a bag full to overflowing. On that day alone fully two thousand were killed. On December 28 they were so abundant that every clump of bushes contained from ten to fifteen birds. One man killed fifty-eight without moving from his 'stand' except to pick up the birds he killed.

The flight lasted six days, and during that time it would be safe to put the number of Woodcock killed and seen at ten thousand. The markets were overstocked, and they could be bought for twenty-five cents a pair, when normally they sell for seventy-five cents.—ARTHUR T. WAYNE, *Mount Pleasant, South Carolina.*

Gambel's Partridge at San Bernardino, California.—On January 15, 1893, Mr. J. S. Bright sent me a male Gambel's Partridge (*Callipepla gambeli*) which he killed near here. This is, I believe, the first capture of this species here, though it is found at Whitewater, sixty miles distant. The bird was in very poor flesh, but in good plumage.—EDWARD WALL, *San Bernardino, California.*

Antrostomus vociferus in South Carolina in Winter.—An adult male Whippoorwill was brought to me on January 6, 1893, that had been caught in a small steel trap. The trap was set by a lad purposely for this bird, as I had offered him a reward. It was caught by one foot.

The fact that this bird was taken during the coldest weather that South Carolina ever experienced for more than forty years makes it probable that this bird winters regularly in this locality.—ARTHUR T. WAYNE, *Mount Pleasant, South Carolina.*

The Horned Lark (*Otocoris alpestris*) near Charleston, South Carolina.—On January 18, 1893, there was a fall of snow. This is a remarkable occurrence for the coast region of South Carolina. The weather was bitterly cold during the following seven days, when it moderated.

I was afield early every morning, and I was well repaid on the morning of the 20th, when I discovered three Horned Larks soaring very high. Finally one alighted in a corn field, when it was promptly shot.

The same day I discovered a flock of about fifteen, which were feeding in an old field. I secured two, on the ground, and two while they were flying, making five taken in all.

I failed to find the birds after they flew away, although I searched every field carefully for miles in every direction. No more were seen on the following days.

As far as I am aware this is the first record for the seaboard of South Carolina, and the most southerly record of its occurrence. To make sure of the form I sent a specimen to Mr. William Brewster, and he has pronounced it true *alpestris*.—ARTHUR T. WAYNE, *Mount Pleasant, South Carolina.*

Acanthis linaria in Alabama.—In September, 1874, a male Redpoll was shot by the writer near Stevenson, Alabama. I can find no other record for this species south of latitude 35°, and, judging from my own observations in Tennessee and northern Georgia, this is a very rare bird in either of the above-named States.—F. T. PARK, *Warner, Hickman Co., Tennessee.*

The Field Sparrow Wintering in Massachusetts.—On the 19th of December, 1892, I found a Field Sparrow (*Spizella pusilla*) in Wellesley, Massachusetts, and three weeks later, January 8, saw it again in the same place—a sheltered and sunny nook, with a weedy garden patch and plenty of thick evergreens. My only previous meeting with this Sparrow during the winter months was in Wakefield, Mass., December 21, 1890.—BRADFORD TORREY, *Wellesley Hills, Mass.*

Junco ridgwayi in Colorado.—While collecting near Boulder, Colorado, Nov. 25, 1892, I secured a specimen of *Junco ridgwayi* Mearns. The pink of the sides is not so extensive as in specimens of *Junco annectens* in

my collection. The color is quite as deep, however. Measurements (in millimetres): wing, 84; tail, 77.5; bill from nostril, 8.5; tarsus, 19.5. To place the bird's identity beyond dispute I sent it to Mr. Robert Ridgway, who writes me as follows:—

"I have carefully compared your *Junco* with our specimens of '*J. ridgwayi*,' and find that it is, essentially, the same bird. Our specimens, however, are in breeding dress (they are adult male and female, obtained at Ft. Bridger, 'Utah,'—now Wyoming,—May 20, 1858), and consequently are hardly comparable. Still, there is no more difference between your bird, which is an autumnal male, and the Ft. Bridger male than there is between fall and spring specimens of *J. annectens*, *J. caniceps*, or the other species of the genus.

"I still have doubts as to the validity of this bird as a species or even as a permanent race, on account of the circumstance that its characters are an exact combination of those of *J. annectens* and *J. caniceps*. In other words, it may be regarded either as a *J. caniceps* with pink sides or a *J. annectens* with 'red' back."

The bird was found among the willows on Boulder Creek, associated with *J. annectens*, *caniceps*, *aikeni*, and *shufeldti*. Boulder is directly at the base of the foothills, where numerous Juncos may often be found when not one can be discovered away from the sheltering hills.—R. C. McGregor, *Denver, Colorado.*

Unusual Habits of Lincoln's Sparrow.—While collecting Warblers from the top of an elm tree May 23, 1892, I shot two Lincoln's Sparrows, one male and one female. Their manner of feeding and hopping about the branches so closely resembled the Warblers with which they were associated that I could scarcely distinguish one from the other. As this species is of retiring habits and supposed to be confined to low bushes and thickets, I consider this worthy of note.—Willard E. Treat, *East Hartford, Connecticut.*

Wintering of Regulus calendula at Washington, D. C.— On December 5, 1892, I saw and positively identified a single Ruby-crowned Kinglet in the grounds of the Department of Agriculture, and also saw what was presumably the same individual on January 5, 6, and 14, this period covering some of the most severe weather ever known here. This is the first record for the District of the species wintering.—W. E. Clyde Todd, *Washington, D. C.*

Notes on Some Connecticut Birds.— Hydrochelidon nigra surinamensis.—A young bird of this species was killed here August 29, 1892, and is in my collection. There were four of them together, but the others could not be obtained. The previous records for the State are two specimens shot at Goose Island and Milford (*Merriam*, Rev. Bds. Conn., 1877, 135).

Fulica americana.—Although not an uncommon migrant, especially in autumn, this familiar bird was particularly abundant here from September 29 to November 14, 1892.

Aquila chrysaëtos.—A specimen of this Eagle was taken at Essex, some twenty miles south of Portland, Nov. 1, 1892, and is in my cabinet. It was captured alive.

Falco sparverius.—The Sparrow Hawk, always considered a rare resident in this vicinity, was found in unusual numbers during the winter of 1892–93. They could be seen nearly every day. On the 4th of February I saw one in Hartford considerate enough to capture an English Sparrow.

Strix pratincola.—A female Barn Owl was shot at Leesville, a dozen miles south of this place, June 11, 1891, and brought to me alive. This is the first instance known of the bird's occurrence in this vicinity. Six are on record from different sections of the State.

Asio wilsonianus.—In many years' collecting in this vicinity I have never known the Long-eared Owl so numerous as during the autumn of 1892. They were apparently migrating from the first week in October until early in December.

Coccothraustes vespertinus.—Recently, when examining the collection of birds made by Mr. H. E. Rich, of East Hampton, Conn. (nine miles east of Portland), I saw an adult male of the Evening Grosbeak which was killed in that vicinitv March 2, 1890. Mr. Rich informed me that there were twelve or fourteen in the flock, and that several Pine Grosbeaks were with them. The other Evening Grosbeaks reported from this State were taken at Portland, March 6, and Gaylordsville, March 10, of the same year, during the remarkable irruption of the species at that time. ('Forest and Stream,' XXXIV, March 27, 1890, 187;—Auk, VII, April, 1890, 211.)

Melospiza lincolni.—A male of this rare Sparrow, now in my collection, was shot here September 21, 1892, by Mr. W. E. Treat.

Zonotrichia leucophrys.—These migrating Sparrows were abundant here on the 12th of October, 1892. I have never known them to visit us in such numbers before.

Sitta canadensis.—An unusual flight of the Red-breasted Nuthatch was observed here from Sept. 27 to Oct. 23, 1892, the height of the migration being about the middle of October. They were quite common in other sections of the State during the same period.—JNO. H. SAGE, *Portland, Conn.*

Winter Birds in Connecticut.—On Dec. 15, 1892, I had a fine specimen of *Rallus elegans* brought to me in the flesh to be mounted. The bird is a male in fine plumage and was shot on the salt marshes at Milford, Connecticut, about nine miles from here. On Jan. 18, 1893, a freshly killed specimen of the Rose-breasted Grosbeak was brought in. The bird was shot at Southington in the central part of the State, and was a male, and was apparently in good condition. While skinning it I discovered that the

left tibia had been broken and healed again quite recently. The plumage was that of the young male as found here during the spring migrations. On January 19 I purchased a fine male of the Great Gray Owl from a farmer who had shot it the day before at North Haven. The Owl was still alive.—A. H. VERRILL, *New Haven, Connecticut.*

Notes on Helminthophila chrysoptera, pinus, leucobronchialis and lawrencei in Connecticut.—The brief notes herein given are from Portland, a locality which seems a favorite resort for these interesting and perplexing Warblers.

Helminthophila chrysoptera is a not uncommon summer resident, arriving as early as the 8th of May and frequenting dense swamps and swampy woodland. It is partial to hickory, oak and buttonwood trees, and when migrating in the spring may be found on high scrubby ground and in old pastures and orchards. The past season (1892) a male was captured in my door-yard—an unusual place, as it is not the custom of this Warbler to visit the thickly settled portions of the village.

To hunt this bird successfully it is necessary to become familiar with the odd song. Did it not in this manner reveal its identity, it would be almost impossible to find it when perched among the young leaves on a buttonwood or hickory tree.

My series of skins of this species, taken here during the past eighteen years, shows many odd variations.

A nest containing four fresh eggs was taken June 4, 1892. It was on the ground in a swampy spot and under a skunk cabbage (*Symplocarpus fœtidus*). The eggs are pure white, evidently an abnormal set. The female was secured as she flew from the nest. The male was also seen. It had the typical black throat. I believe the eggs of this Warbler have not been recorded from the State before.

In other sections of Connecticut *H. chrysoptera* is considered rare. At Saybrook, New Haven, Bridgeport and Seymour they are seldom seen. Mr. Willard E. Treat, an experienced collector living at East Hartford, Conn., (fifteen miles north of this place) tells me that he has never found there any of the Warblers mentioned in this article.

The interbreeding of *chrysoptera* and *pinus*, at Portland, was noted in 'The Auk' (Vol. VI, July, 1889).

Helminthophila pinus comes to us the first week in May, and is a regular, but rare, summer resident. While here it does not wander far from a swampy spot grown up with alders, a few maples and an occasional oak and elm. A nest with four eggs, and one of *Molothrus ater*, was taken May 31, 1887.

Mr. Brewster's long-named Warbler, *Helminthophila leucobronchialis*, would seem to be a regular summer visitant, as we have taken it now for seven successive years. It appears by May 10, and is in full song until the middle of June.

Continued experience leads me to think that the song of this puzzling bird is not, as has been stated, any criterion by which to distinguish it. Sometimes they sing *exactly* like *chrysoptera*, again like *pinus*, and often have notes peculiar to themselves. A trained ear may find the bird, but it needs the eye to properly identify it.

At the present writing I am not inclined to believe *leucobronchialis* a hybrid, but hope to have more to say on this subject at another time.

One example only of *H. lawrencei* has been taken, a male, May 14, 1887. The yellow below is not as bright as in some specimens that I have seen from New Haven and Stamford.

All of the Warblers referred to inhabit similar ground, and, with the exception of *lawrencei*, are occasionally taken the same day. It is safe to say that *chrysoptera* is common here, then in order of abundance come *leucobronchialis* and *pinus*, *lawrencei* being extremely rare.—JNO. H. SAGE, *Portland, Conn.*

Correction.—On page 90 of the January 'Auk,' under *Helminthophila celata*, it should be stated that the records quoted are not all there are from the Eastern States, but merely those from the near vicinity of Long Island. Under *Turdus aliciæ bicknelli*, the statement that "I shot two Bicknell's Thrushes on Oct. 5, 1892," is incorrect. The only birds I ever secured on Long Island were those referred to in the second clause as killed in 1889, and the remarks in the first clause refer to those also.—ARTHUR H. HOWELL, *Brooklyn, New York.*

The Occurrence in Summer of Certain Warblers at Beaver, Pennsylvania.—The following notes are presented as supplementary to those published in 'The Auk,' Vol. VIII, 1891, pp. 397–399.

Helminthophila pinus.—A single individual was observed June 16, 1892, making the third record for this locality.

Geothlypis formosa.—This bird, which I have previously recorded as a rare summer resident, I found to be fairly abundant, in suitable situations, throughout the season of 1891, as well as during the week from June 13 to 18, 1892, inclusive, which I spent there, so that it seems not improbable that it was overlooked in previous seasons. Towards the close of May, 1891, I discovered a nest, containing one egg, but it was soon afterward invaded by a Cowbird, and deserted. Young out of the nest were found during my visit in 1892.

Sylvania mitrata.—On June 17, 1892, I found a pair feeding their young which had just left the nest. This was at the precise spot where the species had been repeatedly observed during September of both 1890 and 1891.—W. E. CLYDE TODD, *Washington, D. C.*

CORRESPONDENCE.

[*Correspondents are requested to write briefly and to the point. No attention will be paid to anonymous communications.*]

"A Neglected Branch of Ornithology."

To the Editors of The Auk:—

Dear Sirs: Chief among the reasons, so it seems to the writer, why our younger ornithologists neglect not only the pterylography of birds, but many other equally important branches of ornithology, are the time, care, and patience needed for the prosecution of such work, the labor required for the accumulation of facts, and the difficulty of properly publishing results.

Most workers, especially the younger ones, like to behold the fruits of their labors, and most of them, too, like to see some of these fruits dished up in type. The easiest and quickest means for the accomplishment of these desires is first to 'make a collection' and secondly to publish a 'local list,' and to these ends most of our rising ornithologists devote themselves. Not that this is much to be wondered at, for the work of collecting is pleasant, and the seeking of feathered prizes by wood and stream has a charm about it that few can find in pottering over ill-smelling alcoholics, or tediously dissecting some fresher specimen. The time needed to plot the pterylosis of one bird would make the skins of a score, and give results far more filling to the cabinet and pleasing to the eye.

Does not Dr. Allen, in his note appended to Mr. Clark's letter, tell us of months of toil whose results have never been published, and did not Dr. Allen give up the study of pterylography? And did not Mr. Ridgway give us a most important paper on the osteology of the Falconidæ, and did he ever give us a second?

If, then, acknowledged leaders like these should seem to prefer the external characters of birds, it is small wonder that lesser men should strive to follow in their footsteps. Nevertheless it is a pity, with so much work yet to be done, so many problems still unsolved, that so large a number of our ornithologists should keep on amassing skins, as if that were the chief end of ornithology.

Washington, D. C., Feb. 19, 1893. Frederic A. Lucas.

NOTES AND NEWS.

THE UNVEILING of the monument to JOHN JAMES AUDUBON, at Trinity Cemetery, New York City, will occur on Wednesday, April 26, 1893, at 3 P. M., under the auspices of the New York Academy of Sciences, with appropriate addresses by Professor Thomas Egleston and others. The exercises at the cemetery will be followed by a commemorative meeting in the lecture hall of the American Museum of Natural History, at 8.30 P. M., at which an address will be delivered by Mr. D. G. Elliot, on 'The Life and Services of Audubon.' The monument has been completed in accordance with the plans announced some time since in 'The Auk' (V, 1888, p. 231). Invitations to attend the public exercises as above announced will be sent to a large number of ornithologists and naturalists, both in this country and abroad.

CAPT. CHARLES E. BENDIRE will be under many obligations to any readers of 'The Auk' for breeding specimens, male and female, of he different species and subspecies of the genera *Junco* and *Otocoris*, nesting west of the Great Plains, and especially those from the Pacific Coast, Arizona and New Mexico. He desires this material for the purpose of enabling him to define the *breeding ranges* of the various species and subspecies as accurately as possible in his work, 'The Life Histories of North American Birds,' now in course of preparation under the direction of the Smithsonian Institution and the United States National Museum, Washington, D. C. Specimens loaned for this purpose will be promptly returned. Accurate and interesting breeding records of our rarer birds will also be acceptable and due credit will be given for the same. Address, CAPT. CHARLES E. BENDIRE, Smithsonian Institution, Washington, D. C.

MR. HUBERT LYMAN CLARK of Pittsburgh, Pa., is studying the pterylography of the North American Gallinæ and is in need of further material. The species especially desired are *Colinus ridgwayi*, *Cyrtonyx montezumæ*, *Lagopus welchi*, and *Tympanuchus cupido*. Mr. Clark would be glad to be placed in communication with any one able to supply alcoholic material or fresh specimens. His address is 3922 Fifth Avenue, Pittsburgh, Pa.

MR. FRANK M. CHAPMAN, of the American Museum of Natural History, New York City, sailed for the Island of Trinidad, B. W. I., February 11, where he will spend several months exploring the natural history of the island, giving, of course, special attention to birds. Late advices announce his safe arrival, and indicate that every prospect is favorable for a rich harvest of ornithological specimens. Although this is by no means a new field, its resources prove not to have been exhausted when subjected to the prying scrutiny of an expert in field work.

A NEW and important limited edition of 'The History of the Expedition under the Command of Captains Lewis and Clark to the Source of the Missouri River, thence across the Rocky Mountains, and down the Columbia River to the Pacific Ocean, performed during the years 1804–5–6, by order of the Government of the United States,' is announced by Francis P. Harper, a New York publisher, to be ready for delivery "in the spring of 1893." This will be a reprint of the original Biddle-Allen edition of 1814, under the competent and especially fitting editorship of Dr. Elliot Coues. The original two volumes will be expanded to four, through the addition of copious explanatory, geographical and scientific notes to the text, and of bibliographical and biographical matter. Dr. Coues is fortunate in having access to the original journals and field notes of both Captains Lewis and Clark, and other authentic original documents bearing on the history of this famous expedition. That he will use them to the best advantage is beyond question, with results of the highest interest to the naturalist and the historian.

WE HAVE received a prospectus of a work entitled 'The Birds of Montreal, 1893,' by Mr. Ernest D. Wintle. It will be a copiously annotated list of the birds of the Island of Montreal and vicinity, with some illustrations of the rarer species, giving the results of Mr. Wintle's ten years' observations in the district mentioned. The book will be sold by subscription, by Desbarats and Co., 73 St. James St., Montreal.

THE FOLLOWING changes and corrections should be made in the addresses of English Members of the A. O. U. as recently published in 'The Auk':—

DALGLEISH, JOHN J., Blackstone Grange, Bogside Station, Stirling, Scotland.

HUXLEY, Prof. THOMAS H., Eastbourne, Sussex, England.

LAYARD, EDGAR L., care Zoölogical Society, 3 Hanover Square, London, W.

OATES, EUGENE W., care Zoölogical Society, 3 Hanover Square, London, W.

SEEBOHM, HENRY, 22 Courtfield Gardens, London, S. W.

SHELLEY, Capt. G. E., 10 Thurloe Square, London, S. W.

WALLACE, Prof. ALFRED R., Parkstone, Dorset, England.

The following are to be added to the list of Associate Members:—

FOWLER, FREDERICK HALL, Foot Bowie, Arizona.

GILBERT, HAROLD L., 149 13th St., Portland, Oregon.

HEYLER, J. C., Nauvoo, Pennsylvania.

MÉNGE, Capt., J. F., Myers, Florida.

MILLER, H. E., Croton Falls, New York.

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HYBRID. JUNCO + ZONOTRICHIA.

THE AUK:

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A HYBRID SPARROW (*ZONOTRICHIA ALBICOLLIS* + *JUNCO HYEMALIS*).

BY WITMER STONE.

THE rarity of hybrid birds in a state of nature and the great interest which they possess, not only for ornithologists, but also for naturalists in general, renders it desirable that such hybrid specimens as have been secured should be well described and figured. With this object in view the Editors of 'The Auk' have had the accompanying plate prepared, illustrating the hitherto unfigured hybrid between the White-throated Sparrow and Slate-colored Junco. The original painting from which the plate was made is the work of Mr. Ernest E. Thompson, who is well known for his many beautiful illustrations of bird life. The bird here represented was secured by Mr. William L. Baily near Haverford College, in Montgomery County, Pennsylvania, on December 12, 1882, and was first described in the Bulletin of the Nuttall Ornithological Club, Vol. VIII, p. 78, by Mr. Charles H. Townsend.

Mr. Baily has recently had the specimen mounted, and has presented it to the Academy of Natural Sciences of Philadelphia, where it is now exhibited in the collection of local birds which is being formed for the museum by the Delaware Valley Ornithological Club.

This bird, which is a male, combines the characters of *Zonotrichia albicollis* and *Junco hyemalis* in nearly equal proportions. The upper surface and wings have the general aspect of the *Zonotrichia*, but the black shaft stripes are narrower and the rufous is more or less suffused with slaty, this shade predominating on the head, where the central white stripe is entirely obliterated and the black stripes considerably broken. Beneath the pattern of coloration is that of the *Zonotrichia*, but the breast and sides are of a darker slaty hue. The superciliary stripe is reduced to a white spot behind the nostril and there is a faint dusky maxillary stripe. The outermost tail feathers have the terminal two thirds white, and there is a white terminal spot on the inner web of the next pair.

DESCRIPTION OF A NEW HUMMINGBIRD FROM NORTHERN MEXICO.

BY WILLIAM BREWSTER.

Among the birds collected for me in Sonora, Mexico, in 1887, by the late Mr. J. C. Cahoon, is a Hummingbird which I was unable to identify until, during a visit to England in 1891, I showed it to Mr. Salvin who at once pronounced it to be a new species. It may be characterized as follows:—

Cyanomyia salvini.[1] SALVIN'S HUMMINGBIRD.

Specific characters.—Similar to *C. cyaneicollis*, but smaller, with shorter wings, shorter and squarer tail, but longer and slenderer bill; iridescent colors on sides of neck bordering the throat, blue like the crown

[1] To Osbert Salvin, Esq.

instead of greenish; very much more green on sides of breast and body, the white of the under parts, especially of the throat and jugulum, being confined to a narrow central space; upper mandible light reddish at the base instead of black as in *cyaneicollis*.

Type, ♂ *adult* (No. 24,125, collection of William Brewster, Nacosari, Sonora, Mexico, March 31, 1887, J. C. Cahoon): Top and sides of head, with sides of neck, glittering blue; remainder of upper parts rather dull, dark, but shining green, somewhat obscured by drab on the rump and upper tail-coverts; shoulders and wing-coverts green like the back but all the quills dark hair brown with a faint gloss of purplish; tail dark glossy green, the outer pair of feathers broadly tipped with drab; under parts soiled white, the middle of the throat tinged with clayey buff (a stain, probably), the feathers along its sides with large, crescent-shaped, subterminal spots of blue; sides of the breast greenish blue; sides of the body brilliant green; bill (in the dried specimen) dull reddish brown or brownish orange, lightest at the base, deepening to horn color at the tip. Wing, 2.07 inches; tail, 1.27; length of culmen from base, 1.02; from feathers, .88; width of bill at base, .13.

I have compared this specimen — which as far as known is unique — with six Peruvian examples (including the type) of *cyaneicollis* in the collection of the British Museum. Although in general coloring it bears a closer resemblance to this species than to any other of the genus, Mr. Salvin is of the opinion that its true relationship is with *C. quadricolor* (= *C. ellioti* Berl). From the latter, however, as well as from *C. violiceps*, it differs very decidedly in the brighter green of the neck and back, in the blue instead of purplish reflections on the crown, and in the blue or greenish on the sides of the neck and body. It is smaller than *C. cyanocephala*, with a shorter tail, and white instead of gray under tail-coverts.

DESCRIPTION OF A NEW MARSH WREN, WITH CRITICAL NOTES ON *CISTOTHORUS MARIANÆ* SCOTT.

BY WILLIAM BREWSTER.

IN 1888 Mr. W. W. Worthington sent me some odd-looking Marsh Wrens from Sapelo Island, Georgia. They were evidently not *C. palustris*, and as they agreed in several respects with Mr.

Scott's description of *C. marianæ* I referred them[1] to the latter without much hesitation, attributing certain peculiarities which they exhibited to individual variation.

At the time I had only two specimens of *marianæ*. There are now before me forty, of which five, including the types, have been kindly loaned by Mr. Allen from the collection of the American Museum, while one has been supplied by Mr. Manly Hardy, the remaining thirty-four being contained in my own collection. Of the total number, two were taken at Cedar Keys and thirty-eight at Tarpon Springs, Florida. Of the supposed *marianæ* from our south Atlantic coast I have now ten specimens (a list of which will be given later) and of *C. palustris* no less than eighty-six skins, including many winter specimens from our Southern States and illustrating certainly all the seasonal, and probably most of the individual and geographical, variations to which the last-named species is subject.

This material shows conclusively that the peculiar Marsh Wrens from Georgia and South Carolina, just alluded to, are quite distinct from *marianæ* and represent a strongly characterized form which may be described as follows:—

Cistothorus palustris griseus, new subspecies. WORTHINGTON'S MARSH WREN.

Subspecific characters: Of the size and proportions of *C. marianæ* but with less black above and no distinct dark markings on the under tail-coverts, flanks, sides or breast. General coloring very much paler and grayer than in either *marianæ* or *palustris*. Bill colored as in *C. marianæ*.

Type, ♂ (No. 19,008, collection of William Brewster, Sapelo Island, Georgia, Nov. 17, 1887, W. W. Worthington): Above including the wings, tail, and the sides of the head and neck, hair brown with the faintest possible tinge of reddish on the hind back, rump, and upper tail-coverts; sides of crown clove brown; the feathers over a short, narrow area on the middle of he back dull black with narrow white shaft streaks; inner secondaries edged with blackish; upper tail-coverts and middle tail-feathers with indications of

[1] The specimens here mentioned were recorded by me in the Auk (Vol. V, no. 4, Oct., 1888, p. 432) as *C. marianæ*, and this form was afterwards reported from Charleston, South Carolina, by Mr. Wayne (Auk, Vol. VIII, no. 2, April, 1891, p. 239) and by Mr. Ridgway (ibid., p. 240). I have not seen Mr. Ridgway's bird, but Mr. Wayne's—for the identification of which I am responsible—was similar to the specimens taken in Georgia by Mr. Worthington.

dusky bars, appreciable only in a good light; outer two pairs of tail-feathers with broad, continuous, and perfectly distinct dark bands; middle of throat and abdomen pure white; remaining under parts pale grayish brown more or less tinged with pinkish on the jugulum and sides; under tail-coverts whitish with very faint, confused, transverse markings of reddish brown; similar but still fainter reddish markings on the breast and flanks; a fairly well defined, whitish, superciliary stripe. Bill uniform dark horn color, lightening only at the extreme base of the lower mandible where it is brownish flesh-color.

The small size, short wings, slender bill, dark under mandible, and clouded breast of this form, indicate that it is most nearly related to *marianæ*, despite the fact that its general coloring is even paler and more uniform, and its dark markings are less pronounced, than in *palustris*, whereas *marianæ* is decidedly the deepest colored and most boldly marked of the three. In respect to the coloring of the upper parts Mr. Scott's types do not represent his bird at all fairly, for they are exceptional in having rather less and duller black on the crown and back than is usually found in *palustris*. Average specimens of *marianæ* have more black than *palustris*, and the dark extremes show little or no trace of the usual light area on the centre of the crown, practically the whole top of the head, as well as the nape, being solidly black.

The dark bars of the rump and upper tail-coverts, although usually present and often conspicuous, are nearly or quite wanting in some otherwise typical specimens of *marianæ*, but the conspicuous barring of the under tail-coverts is very constant and affords one of the best characters of this form.

My specimens of *griseus* exhibit a good deal of individual variation; but with the exception of one bird, which has a few distinct blackish spots on the flanks and sides of the breast, they maintain very uniformly the characters mentioned in the above diagnosis. Several are even grayer and less marked than the type, and Mr. Hardy's bird (♂, McIntosh Co., Georgia, Feb. 1, 1893, W. W. W.) actually lacks nearly all trace of the usual black areas on the head and back, the uniform grayish brown of the upper parts being diversified only by a scarcely appreciably dusky stripe on each side of the crown and a few minute, half-concealed, whitish spots on the interscapulars. In the general coloring of the under parts *C. p. griseus* bears a curiously close resemblance to the

gray extreme of *Troglodytes a. aztecus*. Indeed I find it possible to select specimens of the two which, when laid side by side on their backs, are scarcely distinguishable by color alone.

For comparison with the following measurements of the ten specimens of *griseus* I have added these of an equal number of representatives of *marianæ* and *palustris* selected quite at random from the large series before me. The measurements are in inches.

C. p. griseus.

Cat. No. Col. W. B.	Sex	Locality	Date	Wing	Tail	Tars.	Cul. from feathers	Cul. from nostril	Depth of bill at nostril
42,104		Mt. Pleasant, S. C.	Mar. 9, 1891	1.72	1.41	.69	.50	.41	.13
42,013	♂	" " "	Oct. 14, "	1.79	1.54	.76	.50	.40	.12
———	♂	McIntosh Co., Ga.	Feb. 1, 1893	1.94	1.66	.77	.57	.41	.12[1]
19,008	♂	Sapelo Island, Ga.	Nov. 17, 1887	1.84	1.62	.75	.50	.38	.12[2]
19,007	♂	" " "	" " "	1.82	1.51	.77	.50	.38	.12
19,009	♂	" " "	Dec. 14, "	1.92	1.68	.77	.54	.44	.13
19,012	♂	" " "	" " "	1.84	1.57	73	.53	.44	.12
19,010	♀	" " "	Jan. 28, 1888	1.66	1.32	.71	.43	.37	.11
19,011	♀	" " "	Dec. 3, 1887	1.72	1.54	.73	.50	.38	.12
———	♀	McIntosh Co., Ga.	Jan. 23, 1890	1.74	1.52	.70	.50	.40	.11

C. p. marianæ.

———	♂	Tarpon Sp'gs, Fla.	Jan. 6, 1888	1.87	1.69	.73	.50	.40	.12[3]
27,161	♂	" " "	" " 1890	1.90	1.79	.73	.54	.42	.12
27,163	♂	" " "	" 9. "	1.86	1.63	.77	.56	.42	.12
27,165	♂	" " "	" 13, "	1.92	1.74	.75	.52	.41	.13
27,164	♂	" " "	" " "	1.92	1.71	.71	.53	.40	.12
27,169	♂	" " "	Dec. 30, 1889	1.91	1.80	.70	.54	.44	.12[4]
———	♂	" " "	Feb. 9, 1888	1.98	1.70	.73	.52	.41	.12
———	♀	" " "	Jan. 5, "	1.85	1.57	.73	.48	.37	.12[5]
27,172	♀	" " "	" 6, "	1.82	1.62	.73	.53	.42	.13
27,180	♀	" " "	Feb. 28. "	1.80	1.73	.72	.50	.42	.13

C. palustris.

13,879	♂	Near Concord, Mass.	June 7, 1887	2.05	1.78	.77	.51	.38	.13
13,876	♂	" " "	" " "	1.95	1.69	.72	.54	.40	.13
42,183	♂	New Haven, Conn.	May 19, 1891	1.92	1.75	.78	.51	.38	.13
42,184	♂	" " "	" " "	1.95	1.78	.80	.50	.38	.13
14,223	♂	Yemassee, S. C.	Jan. 4, 1888	2.05	1.74	.80	.56	.43	.12
12,137	♂	Near Charleston, S. C.	Nov. 9, 1886	2.07	1.86	.79	.54	.41	.12
12,774	♂	Kankakee Marshes, Ind.	Apr. 27, 1886	2.11	1.86	.80	.52	.40	.13
13,893	♀	Near Concord Mass.	June 7, 1887	1.90	1.68	.73	.50	.37	.11
13,895	♀	" " "	" 17, "	1.87	1.60	.75	.50	.39	.12
14,225	♀	Yemassee, S. C.	Jan. 4, 1888	1.98	1.73	.79	.51	.40	.12

[1] Coll. M. Hardy.

[2] Type.

[3] Am. Mus. no. 30,195.

[4] Am. Mus. no. 30,197.

[5] Tail partly gone. Type. Am. Mus. no. 30, 194.

The essential points of difference between the three eastern forms of the Long-billed Marsh Wren may be tabulated as follows:—

A.—Size larger, bill stouter, the basal third or more of the lower mandible flesh-colored. Brown of sides, flanks and upper parts clear reddish. White of lower parts usually continuous from chin to crissum.—*C. palustris.*

B.—Size smaller, bill slenderer, the lower mandible horn-colored with, at most, only the extreme basal portion flesh-colored. White of lower parts usually interrupted by a band of dusky grayish or reddish spots or clouding across the breast, and elsewhere confined to a comparatively narrow central space by the encroachment of the brown or grayish of the sides.

1.—Black of the upper parts usually deeper and more extended than in *palustris* and frequently covering practically the entire crown, nape and most of the back. Brown of sides, flanks, and upper parts deep and rusty with a tinge of olive. Under tail-coverts and frequently the flanks, sides, and breast also, boldly marked with black or dusky spots or bars.—*C. p. marianæ.*

2.—Black of upper parts much duller and less extended than in *palustris*, usually confined to the extreme sides of the crown and a short narrow area in the middle of the back, and in extreme specimens almost wholly absent. Brown of sides, flanks, and upper parts pale and grayish. Dark markings of the under tail-coverts, flanks, sides, and breast faint, confused and inconspicuous, sometimes practically wanting.—*C. p. griseus.*

Whether or no *C. p. marianæ* and *C. p. griseus* intergrade, and what are their respective habitats during the breeding season, are points on which my material throws no light. Intergradation is certainly probable, but by no means certain, for if, as seems not unreasonable, we may assume that *marianæ* is resident on, and confined to, the Gulf Coast, and *griseus* equally restricted, at all seasons, to the South Atlantic seaboard, their respective habitats may be, for birds of such sedentary habits, practically isolated. If this should prove true, one of the most curious features of the case will be the fact that so very pale a form as this new Wren has been developed in the salt marshes of Georgia and South Carolina, where its associates, the Seaside Finches and Clapper Rails, although of not dissimilar general coloring, are somewhat darker, instead of much grayer, than their more northern representatives.

A LIST OF THE BIRDS COLLECTED ON THE ISLAND OF TOBAGO, WEST INDIES, BY W. W. BROWN, JR., DURING APRIL AND MAY, 1892.

BY CHARLES B. CORY.

THE collection made by Mr. Brown contained over seven hundred bird skins and a few mammals, including two specimens of *Sciurus griseogenys* Gray. The birds are especially interesting, several of them being new to the island.

Sterna elegans *Gamb.*
Ardea virescens *Linn.*
Ionornis martinica (*Linn.*).
Ortalis ruficauda *Jard.*
Columba rufina (*Temm.*).
Engyptila verreauxi (*Bp.*).
Columbigallina rufipennis (*Bp.*).
Geotrygon linearis (*Knip et Prev.*).
Buteo latissimus *Wils.*
Spizaëtus manduyti *Daud.*
Amazona amazonica (*Linn.*).
Crotophaga ani *Linn.*
Dendrobates kirki (*Malh.*).
Melanerpes terricolor *Berlepsch.*
Chloronerpes rubiginosus (*Sw.*).
Trogon collaris *Vieill.*
Momotus swainsoni *Sclater.*
Ceryle americana *Gm.*
Galbula ruficauda (*Cuv*).
Chrysolampis moschitus (*Linn.*).
Florisuga mellivora (*Linn.*).
Amazilia erythronota (*Less.*).
Campylopterus ensipennis(*Swain.*)
Formicivora intermedia *Licht.*
Dysithamnus semicinereus *Sclater.*
Thamnophilus doliatus (*Linn.*).
Dendrornis sussurans *Jard.*
Pachyrhamphus albo-griseus *Scl.*
Pachyrhamphus niger *Spix.*
Chiroxiphia pareola (*Linn.*).
Tyrannus melancholicus *Vieill.*
Myiarchus tyrannulus (*Müll.*).
Elainea pagana (*Licht.*).
Ostinops decumanus (*Pall.*).
Molothrus atronitens (*Cab.*).
Euetheia bicolor (*Linn.*).
Spermophila lineata (*Gm.*).
Volatinia splendens (*Vieill*).
Tanagra sclateri *Berlepsch.*
Tachyphonus melaleucus *Sparrm.*
Vireo chivi (*Vieill.*).
Hylophilus insularis *Sclater.*
Progne dominicensis (*Gmel.*).
Cœreba luteola (*Cab.*).
Arbelorhina cyanea (*Linn.*).
Troglodytes tobagensis *Lawr.*
Thryothorus rutilus (*Vieill.*).
Mimus gilvus *Vieill.*—In a series of *Mimus* from Tobago all the specimens are paler and more ashy in color on the upper parts than birds from Grenada and St. Vincent.
Merula xanthosceles (*Jard.*).
Merula gymnophthalma (*Cabau.*).

BIRDS OBSERVED ON MACKINAC ISLAND, MICHIGAN, DURING THE SUMMERS OF 1889, 1890, AND 1891.

BY STEWART EDWARD WHITE.

THE ISLAND of Mackinac is situated in the straits of the same name between the two peninsulas of Michigan. It is a rocky island surrounded by steep bluffs which recede far enough inland on the southeast side to form a plain of sufficient size to contain the town and a few adjacent meadows. The only cultivated land is at Early's farm, a clearing of about two hundred acres, the major part of which is pasture. The island itself is six miles by three in its widest parts and contains somewhat over twenty-four hundred acres.

It is nearly completely encircled by a belt of evergreens, varying in width from fifty to several hundred feet, while the middle is occupied by a deciduous growth. Of the evergreens the outer edge is composed chiefly of cedars, while the inside contains balsam firs, hemlocks, and tamaracks. In a few places the hemlocks and firs are found scattered over stony ground free from brush. Both red and white pines occur in scattered clumps. Of the deciduous trees the hard maple is by far the most numerous, with many elms, beeches, white birches, and a few oaks, ironwoods, black birches, silver and soft maples. These woods are remarkably free from brush, though this is more than made up for by a large and almost impenetrable thicket of scrub maples, birches, hazels, oaks, hemlocks, and tamaracks. This occupies about two hundred and fifty acres southwest of the centre of the island, and is most fruitful during migrations.

The island does not offer favorable conditions for the occurrence of most water birds. The water being deep and the coast line unbroken, little food and shelter is offered the Ducks; as there is no beach, the shore birds pass by; the absence of swamps precludes the presence of their inhabitants.

Owing probably to the small size of the island, and to its location, bird waves were strongly defined and easily observed, and were made an object of especial study the results of which

were too extensive to admit of treatment here. It might be observed in general, however, that the migrations there, on the 45th parallel, were from seventeen to twenty days earlier than in Kent County (43°).

The following list gives the result of three summers' active field work. My observations extended from July 1 to Sept. 24, 1889, from July 2 to Sept. 26, 1890, and from July 10 to Sept. 18, 1891, during which time I was constantly in the field. I wish to acknowledge assistance from my brother, Mr. T. Gilbert White, especially during my absence of a week in the middle of August, 1890, and for notes by Dr. R. M. Gibbs of Kalamazoo, June 11 and 12, 1885.

Podilymbus podiceps.—Rare. Occasionally observed in the harbor during the middle of September.

Urinator imber.—Rare visitant from Les Cheneaux Islands where they are common. Seen fishing in the harbor or flying by.

Rissa tridactyla.—Rare. A few accompany the large Gulls in their migrations.

Larus marinus.—Very rare migrant.

Larus argentatus smithsonianus.—Common summer visitant and abundant migrant. Said to breed on Bois Blanc Island. In fall they are abundant but very wild. The first migrants arrived about the middle of August.

Larus delawarensis.—Common migrant. First seen about August 15.

Larus philadelphia.—Dr. Gibbs "saw a flock."

Sterna tschegrava.—Thousands of large Terns accompany the Gulls in migration, but are shy. They resemble each other so much that identification on the wing is very uncertain. I repeatedly took this Tern, and should call it common.

Sterna maxima.—I examined several specimens. Rather more rare than *S. tschegrava*.

Sterna hirundo.—A specimen observed by T. G. White, Aug. 28, 1890.

Hydrochelidon nigra surinamensis.—Dr. Gibbs "saw several."

Merganser americanus.—Not uncommon summer resident in the vicinity of Round Island, a small piece of land a mile from Mackinac.

Merganser serrator.—Not uncommon summer resident at Round Island. A set of nine incubated eggs was taken there, July 4, 1891, from a nest of cedar bark on the ground under a spreading branch of a cedar, about fifty feet from the water but within five feet of a stone beach.

Anas boschas.—Rather rare visitant. Seen more often flying by.

Aix sponsa.—A male was seen July 11, 1889, sitting on a horizontal limb over a small pond of water, which was caused by heavy rains.

Charitonetta albeola.—I observed one flock of eight July 3, 1890.

Erismatura rubida.—I examined a single specimen killed by a boy Sept. 3, 1890.

Botaurus lentiginosus.—Rare resident in the marshes near Early's farm and the town. Several observed at various times, and one specimen taken by T. G. White.

Ardea herodias.—Rare summer visitant from Les Cheneaux where it is common.

Rallus virginianus.—Very rare summer resident.

Porzana carolina.—Common summer resident in marshes at Early's.

Fulica americana.—Dr. Gibbs "saw one."

Philohela minor.—Not a common summer resident in dry woodlands. Often flushed from the middle of shaded roads towards evening.

Gallinago delicata.—Rare migrant. I flushed one in a meadow Sept. 17, 1889.

Tringa minutilla.—Rather rare migrant on Round Island.

Ereunetes pusillus.—One specimen taken Sept. 4, 1889.

Totanus solitarius.—In 1890 and 1891 not a rare summer resident. None present in 1889.

Actitis macularia.—Very common summer resident. Feeds on stone spiders.

Ægialitis vocifera.—Dr. Gibbs "saw a pair."

Colinus virginianus.—The usual northern limit of this bird is about the latitude of Petoskey, so the discovery of two July 24, 1890, was somewhat surprising. None were seen before or since. Mr. Early states that they were once common on his farm, but were exterminated by hunters.

Ectopistes migratorius.—A large flock was seen feeding in beech woods August 30, 1889, after which they were frequently seen. About a hundred were observed Sept. 10, and on Sept. 12 the main body departed. But a few individuals were present when I left. None were observed in 1890 or 1891.

Zenaidura macroura.—Rare in summer.

Circus hudsonius.—Common migrant, frequenting the overflowed meadows near Early's farm. First seen Aug. 3; became common Aug. 5; last seen Aug. 22.

Accipiter velox.—Common migrant near Early's farm where it preys on chickens, Flickers, and even ventures to attack the Crows. A fearless bird, permitting close approach. First seen Aug. 8–21; still present when we left the island.

Accipiter cooperi.—Common migrant. Occurs in smaller numbers than *A. velox*. It has about the same dates of arrival and departure.

Accipiter atricapillus.—In 1889 two pairs of this fine bird could be seen on any clear day. They were not given to sailing high in the air as do the Buteos, but swept over the country just above the tops of the trees. In 1890 but one pair was observed, and upon inquiry I found a boy who claimed to have shot a "large white hawk with black on his head; he weighed three pounds." So it is probable that he secured one of this

species. The last pair had disappeared in 1891. My efforts to procure specimens were unavailing, although I saw them almost daily, and with powerful glasses examined them both sailing and perched. I am familiar with the bird, and am sure there can be no mistake in identification.

Buteo borealis.—Rare summer visitant, though at times common when they come over from the mainland to hunt.

Buteo lineatus.—Rare summer resident, and at times a rather common visitant. A pair lived on the island in 1890.

Buteo latissimus.—The only record for this species is one, Sept. 1, 1889.

Haliæetus leucocephalus.—In 1889 three of these birds, two adults and one young, were seen at various times during the summer. In 1890 only one of the old ones and the young one were observed. The female was shot by a local taxidermist. In 1891 two mature and two young were on the island. These birds are common at Les Cheneaux.

Falco sparverius.—Common migrant. Arrives about the middle of August and remains until the middle of September.

Pandion haliaëtus carolinensis.—Rare visitant from the mainland where it is rather common.

Syrnium nebulosum.—I found the remains of one in July, 1889, and saw two Aug. 15, 1890.

[**Nyctala acadica.**—My brother, T. G. White, who knows the bird, writes me of a bird of this species which he saw in captivity at various times during the summer of 1892.]

Coccyzus americanus.—One seen July 6, 1889.

Coccyzus erythrophthalmus.—One specimen taken July 13, 1889. Not uncommon summer resident in 1890 and 1891.

Ceryle alcyon.—Rather rare during 1889. Very common in 1890 and 1891.

Dryobates villosus.—Rare. Seen Aug. 9 and Sept. 6, 1890, and July 28, 1891.

Dryobates pubescens.—Not a Woodpecker is found on the island during the summer, and this is the first species to appear, arriving the last of July.

Sphyrapicus varius.—Rare migrant; a number observed at widely separated intervals.

Ceophlœus pileatus.—Rare, in the high maple woods. Said to be common in winter.

Melanerpes erythrocephalus.—In 1889 a rare migrant; I shot two immature birds Sept. 11 and 14. Not uncommon migrant in 1890 and 1891. Arrives from Sept. 4 to 9.

Colaptes auratus.—Abundant migrant. Arrives July 15–25.

Chordeiles virginianus.—Rare summer resident and common migrant. Becomes common Aug. 12–27. Last seen Sept. 2–5.

Chætura pelagica.—Common summer resident. Last seen Aug. 29–Sept. 2.

Trochilus colubris.—Rare resident. Seen at all times of the summer and in the fall even after most Warblers had departed.

Tyrannus tyrannus.—In 1889 but one pair was observed, but in 1890 three pairs were seen, and in 1891 they were quite common. Migrants become common Aug. 3–9, and all depart Aug. 26–30.

Sayornis phœbe.—In 1889 a rare summer resident until Aug. 26. In 1890 none were seen. In 1891 one pair observed occasionally. Frequents the scattered woods.

Contopus borealis.—One specimen shot Aug. 15, 1890.

Contopus virens.—Not common as a summer resident, but a common migrant. Frequents the deciduous woods. Becomes common Aug. 7–10. Last seen Sept. 2–10.

Empidonax flaviventris.—Rare migrant; taken Aug. 14 and 30, 1890.

Empidonax acadicus.—Common migrant. I have taken many specimens. Frequents impartially the open woods and high scrub growths. Arrives Aug. 10–16; departs Aug. 31–Sept. 6.

Empidonax pusillus traillii.—Abundant migrant. Arrives Aug. 5–14; departs Sept. 3–10.

Empidonax minimus.—In 1889 this species was observed only as a common migrant, but in 1890 and 1891 a few were found during the summer near Early's farm. In 1889 it was first seen Aug 3. It becomes common about the last of August and disappears in a few days.

Otocoris alpestris.—Very common about the middle of September. The Indians shoot numbers of them for food under the name of 'Yellowthroat.'

Cyanocitta cristata.—In 1889 and 1891 very common summer resident. Rather more scarce in 1890. Useful as scavengers.

Perisoreus canadensis.—On July 10, 1889, a flock of eight flew over me low down and headed for the Upper Peninsula. I did not see them again, but am certain as to their identity, for I am perfectly familiar with the 'Meat Hawk.'

Corvus americanus.—An abundant resident and very tame. I have often approached within a few feet of them while feeding. As there are no crops to be damaged, the inhabitants protect them for their services as scavengers.

Molothrus ater.—Rare migrant, seen occasionally during September in scattered flocks.

Sturnella magna.—Rare visitant. I flushed four in a meadow near town July 12, 1889, but none were seen before or since.

Scolecophagus carolinus.—Saw a flock of about twenty at Early's farm Sept. 22, 1889. None observed in the other years.

Quiscalus quiscula æneus.—For four days in 1889, Sept. 11–14, these birds migrated through the island in abundance, but none were observed in 1890 or 1891.

Carpodacus purpureus.—Common summer resident. Frequents the evergreens where its loud and clear song may be heard morning and evening, and during the whole of cloudy days.

Loxia curvirostra minor.—Common summer resident. Probably breeds

early, as old and young were gathered into large flocks when we reached the island during the last week in June.

Loxia leucoptera.—Rare summer resident. I have frequently observed this species and once, July 9, 1890, I secured a specimen.

Spinus tristis.—Common summer resident.

Spinus pinus.—Not observed during 1889 or 1890, but fairly common in large scattered flocks July 27–29, 1891. Rather more shy than in winter.

Poocætes gramineus.—Common summer resident in the pastures at Early's farm. Not observed elsewhere. Departs for the south about the middle of September.

Zonotrichia leucophrys.—Rare migrant; one observed in the bushes Aug. 12, 1889.

Zonotrichia albicollis.—Abundant summer resident among the scattered evergreens. Last observed Sept. 2–5.

Spizella socialis.—Common summer resident. Found everywhere, but not in such abundance as farther south. Departs about Sept. 12.

Spizella pusilla.—Rather common summer resident in suitable localities. Departs Aug. 10–24.

Junco hyemalis.—Common summer resident.

Melospiza fasciata.—Common summer resident. Still present when I left.

Pipilo erythrophthalmus.—One pair was observed during the summer of 1890, but none were seen the other years.

Habia ludoviciana.—A young male was shot July 24, 1890, among the bushes near Early's farm. I examined an adult male said to have been collected on the north shore near St. Ignace.

Passerina cyanea.—In 1889 and 1891 a common summer resident, frequenting the scattered evergreens and bushes. In 1890 only a few were observed. Departs about the last week in August.

Piranga erythromelas.—Rare. A female of this species was shot in the oak woods Aug. 3, 1889, but a careful search failed to disclose a male. A male was observed July 17, 1891.

Progne subis.—Two pairs observed in 1889, four pairs in 1890, and nine pairs in 1891. Breeds about the Grand Hotel. Departs Aug. 7–20.

Petrochelidon lunifrons.—Rare in 1889, about a dozen being observed. Abundant migrant in 1890, becoming numerous Aug. 4, 5, and 6, and again Aug. 20 and 21. In 1891 they were quite common until July 29 when all disappeared.

Chelidon erythrogaster.—Abundant summer resident. Breeds under the wharves. The bulk departs about Aug. 5, but a few individuals are seen until Sept. 7–11.

Tachycineta bicolor.—Abundant summer resident. Breeds abundantly in boxes placed for that purpose. Straggles away anywhere between Aug. 7 and Sept. 3. This and the preceding occur in countless thousands, and when disturbed rise in clouds.

Cliviçola riparia.—Two individuals of this species were observed July

10, 1889. In 1890 and 1891 they bred abundantly in a gravel pit near Early's farm, departing in the first week of August.

Stelgidopteryx serripennis.—I found one of this species dead in July, 1890, but never saw a living example although I searched diligently.

Ampelis cedrorum.—Common summer resident.

Vireo olivaceus.—Abundant summer resident in maple woods and bushes. Departs Sept. 2–6.

Vireo philadelphicus.—I shot a female of this species Aug. 6, 1889, in a raspberry patch, the fruit of which it was eating. I secured an immature specimen Aug. 7, 1890, and observed two adults Sept. 6, 1890, one of which I secured.

Vireo gilvus.—Not a common summer resident. Departs Aug. 6–10.

Vireo flavifrons.—One specimen Aug. 5, 1891.

Vireo solitarius.—One taken by T. G. White in August, 1891. I have not the exact date at hand.

Mniotilta varia.—Not a common summer resident but an abundant migrant. Found during summer in the evergreens on the steep bluffs. First migrants arrive Aug. 7–10; common by Aug. 26; last seen Sept. 2–6.

Helminthophila pinus.—On Sunday, July 1, 1889, I saw a fine male of this species in an evergreen tree. He permitted the closest scrutiny, sometimes approaching within a few feet of my head in his search for food. I could not find him again the next day.

Helminthophila chrysoptera.—Not present in 1889 and 1890. In 1891 a number were constantly observed in the bushes until July 26.

Helminthophila ruficapilla.—Rare summer resident and common migrant. In summer found among the evergreens; during migrations, among the bushes. The first migrants straggle along about Aug. 10; the bulk arrives in a body about Aug. 25-Sept. 5, and all disappear within a day or two.

Helminthophila peregrina.—Common migrant. Found in bushes and evergreens, rarely in the open woods. Arrives Aug. 6–24; bulk arrives inside of a week; and all leave in a few days, Aug. 28–Sept. 6.

Compsothlypis americana.—Abundant migrant in low bushes and maple woods. First seen Aug. 22–Sept. 1; the bulk arrives almost immediately; and all depart soon, Sept. 5–6.

Dendroica tigrina.—Not uncommon migrant in 1890 and 1891. First seen Aug. 30; departs Sept. 6.

Dendroica æstiva.—Abundant summer resident. Breeds in the evergreens. At first very common; every day sees a diminution of their numbers, until by Aug. 10–12 the last have departed.

Dendroica cærulescens.—In 1889 this species was observed only as a common migrant, but in the succeeding years I found it a not uncommon summer resident. In summer it inhabits the maple woods, but in migration it frequents the evergreens. First seen, in 1889, August 15. Becomes common Aug. 9–21, and departs about the middle of September.

Dendroica coronata.—In 1889 one female was shot July 13, after which the species was not observed until the migration. In 1890 and 1891 they

were rather common during the summer in the high evergreens. The summer residents departed in a body Aug. 1, 1890, and under the date of Aug. 5 Dr. Gibbs wrote from Kalamazoo that the first Myrtle Warblers had arrived. No migrants from the north had yet reached Mackinac. This species arrives about the middle of August, and all depart the first week in September.

Dendroica maculosa.—Found abundantly in the bushes where it is the characteristic summer bird. Departs Sept. 6–11. I detected seven distinct songs of this species, no one of which is even a variation of the other.

1. Three notes followed by one lower: *che-weech che-weech che-ó.*

2. Three sharp clear whistles with a strong *r* sound, then a warble of three notes, the middle the highest, the latter clear cut and decisive: *pra pra pra r-é-oo.*

3. Two quick sharp notes followed by a warble of three notes, the middle the highest: the warble is soft and slurred: *pût pût purreao.*

4. A soft falsetto warble, different in tone from any other bird song: *whu-i-whuy-a.*

5. Of the same falsetto tone, uttered rapidly: *prut-ut-ut-ut-ut.*

6. A harsh note like, in miniature, the cry of a Jay: *d kay kay kay.*

7. A harsh *k-e-e-e-dl*, the last syllable higher by a shade, quick, and subordinated to the first part. The alarm note is a sharp *zeek.*

Dendroica pensylvanica.—Rare summer resident and common migrant. Becomes common the middle of August, and departs the second week in September.

Dendroica castanea.—Rare summer resident and abundant migrant. Found principally among the bushes. Bulk arrives Aug. 28 – Sept. 3. Departs the middle of the month.

Dendroica striata.—Rare summer resident and abundant migrant. Found with *D. castanea;* dates of arrival about the same.

Dendroica blackburniæ.—Observed during 1889 only as a very common migrant frequenting maple woods, during its stay. First seen, in 1889, on Aug. 8 on which date it became common. In 1890 and 1891 it was rather common summer resident among the evergreens. Bulk arrives July 30 – Aug. 8; departs Aug. 31 – Sept. 6.

Dendroica virens.—Abundant summer resident, found principally among the evergreens, though many were observed in the deciduous woods. Departs in the middle of September.

Dendroica vigorsii.—Rare. In 1889 three were seen on Aug. 14; in 1890 I heard a few sing during the first part of July. A few migrants also were observed at wide intervals.

Dendroica palmarum.—Common migrant; arrives late. Found in open woods and on the edges of bushy tracts.

Dendroica discolor.—Common migrant in bushy country. I took many specimens. Arrives Aug. 10–15; departs Sept. 2–6.

Seiurus aurocapillus.—Common in the maple woods. On several occasions it has been my good fortune to hear the beautiful vesper song of this species. Dates Aug. 17 – Sept. 6, a wide difference.

Geothlypis agilis.—I took two specimens, both in the bushes, one Aug. 30, 1889, the other Aug. 30, 1890.

Geothlypis philadelphia.—My brother, T. G. White, shot several of this species in the latter part of August, 1890. Very rare.

Geothlypis trichas.—Not a common summer resident. None observed in 1889. Departs Aug. 23–26.

Sylvania pusilla.—Rare migrant in 1889, a flock of seven Aug. 26 and one female Aug. 30. In 1890 and 1891 a very abundant migrant. Found in new growths and small evergreens. First seen Aug. 25–28; the bulk arrived Aug. 26 – Sept. 1; and a few were still present when I left.

Sylvania canadensis.—In 1889 a rare summer resident and common migrant. In 1890 and 1891 a very common summer resident, its loud song being heard in every patch of evergreens. The young birds left the nests July 2–8. It was still present when we left the island.

Setophaga ruticilla.—The most characteristic bird of the island. It occurs in such amazing abundance that it seems as if every tree contained one of these birds. Still present when I left.

Harporhynchus rufus.—Not a common summer resident. A few were found near the town and in the hedge-rows at Early's farm. Departs the first week in August.

Troglodytes ædon.—In 1889 but two pairs bred at Early's, but the other years they bred commonly about the cottages. Very common as migrants, foraging about in the maple woods in large bands. Bulk arrived Aug. 2–5; departed Aug. 16–24.

Troglodytes hiemalis.—Very common summer resident. I find it impossible to give dates of abundance and departure, because after the song season these birds are very hard to discover.

Certhia familiaris americana.—Rare. Two were observed Aug. 3, 1889.

Sitta carolinensis.—This species was very rare on the island. One was observed Aug. 3, 1889, and one July 2, 1890.

Sitta canadensis.—Common summer resident and abundant migrant. Found everywhere, but more especially in the low pines. First migrants Aug. 2–10. Still present when I left.

Parus atricapillus.—Abundant resident. Found everywhere.

Regulus satrapa.—Common summer resident among the evergreens.

Regulus calendula.—A rare summer resident and a common and early migrant. I found a nest with four nearly fledged young July 20, 1889. The first migrants arrive July 23 – Aug. 10, and the species departs in the middle of September.

Polioptila cærulea.—Rare. Shot one and saw another in mixed woods Sept. 22, 1889.

Turdus mustelinus.—Common summer resident in 1890 and 1891. Not present in 1889.

Turdus fuscescens.—Absent in 1889. Common among the bushes and scrub growths in the other years. Last seen Sept. 2 and 5.

Turdus aliciæ.—One specimen August 23, 1891.

Turdus ustulatus swainsonii.—Common summer resident, departing for the south Aug. 29 – Sept. 4.

During the summer of 1891 some very interesting observations were made as to their song habits. The song of the Olive-backed Thrush begins low and ascends by two regular steps of two notes each, and ends with several sharp notes. The first note of each step is higher than the second, and the second of the next is about the same as the first note of the first step. Occasionally the whole is preceded by a sharp *chuck*. The notes have the swelling beauty of all Thrush songs, while the metallic ending rings like a little bell. The song always says to me,—*gurgle gurgle ting, che che che*. As far as my experience goes, this Thrush never sings steadily except in his chosen tree; in fact for two years one has selected for his perch a small evergreen near our cottage, and it was from him that I procured the following data.

He sings on an average nine and a half times a minute with extreme regularity. During the song periods of morning and evening his constancy of purpose is remarkable; except to seize a passing insect, he never breaks the regular recurrence of his song. From a series of records it is found that he begins on an average about 3.15 A. M., and sings steadily (of course I mean by that ten times a minute, not constantly) until about 9.00 A. M.; he is nearly silent until noon, after which he sings occasionally for a minute or so. About 4.30 he begins again, and only ceases to retire for the night about 7.30 P. M. This is a wonderful record, and were it not verified by long experience, I should myself be inclined to consider it exceptional. Allowing but eight times a minute for his songs, we have, for one day, the time consumed in song periods about eight hours and forty-five minutes, and in occasional song, at least twenty minutes, according to which there would be a total of 4,360 songs per day. His song ceased entirely about July 25, although for five days before that but half the time was employed. Certainly it would not be unfair to allow him at the very least six weeks of song, 42 days at 4000 per day, in all 168,000 songs in a season. The above facts have been many times verified.

Turdus aonalaschkæ pallasii.—A common summer resident, very entertaining on account of its delightful song. Departs Sept. 2–6.

Merula migratoria.—Common summer resident. Shy and a frequenter of the woods, rarely appearing in town.

Sialia sialis.—Rare summer resident and abundant migrant. The bulk arrives the middle of August, and departs the middle of September.

Passer domesticus.—Not one was to be found on the island in 1889 when I first arrived, but within a few weeks about twenty came over with the boat from Mackinaw City. These have increased and now they are quite common.

Besides the above which occur on Mackinac Island proper, I observed the following on the mainland immediately adjacent:—

Bonasa umbellus (subspecies?).—Common on both shores of mainland.

Bubo virginianus.—One seen on north shore Sept. 3, 1890.

Corvus corax principalis.—Common on north shore.

Melospiza georgiana.—Very common on north shore.

A BROOD OF YOUNG FLICKERS (*COLAPTES AURATUS*) AND HOW THEY WERE FED.

BY WILLIAM BREWSTER.

LATE in May, 1892, I noticed a Flicker's hole, then apparently completed, in a very rotten stump covered externally with gray lichens and a species of woody fungus. This stump was one of seven nearly upright but diverging stems, all evidently sprouts from the same roots and six still living. The tree, an ancient white maple, stood on the bank of Concord River, within a few yards of a boat landing. Besides the Flicker's hole the old stump contained at this time two other inhabited nests; a Downy Woodpecker's near the top, and a little lower down a Bluebird's. The Flicker's nest was still lower — about ten feet above the ground.

The Bluebirds first, and shortly afterwards the Downy Woodpeckers, reared and took away their young, after which a pair of House Sparrows entered into possession of the hole which the Downies had vacated. Scarcely had the female Sparrow laid her eggs, when a boy, attempting to climb the stump, broke it off squarely at the entrance hole of the Flicker's nest. For two weeks or more previous to this, I had frequently started one or other of the Flickers from the nest in passing it on my way to the landing; but I had learned little regarding them beyond the fact that their hearing was so keen that I could never quite reach the tree without alarming them, and that during this period (when, as will presently appear, incubation must have been constantly going on) they were frequently at work pecking at the inside of the trunk.

The accident to the stump happened June 23, at about noon. An hour later I examined the nest, which was now entirely open at the top. In the bottom lay five young Flickers, about as large as plucked House Sparrows and perfectly naked. Their eyes were tightly closed and I judged them to be less than a week old. They were writhing and shivering pitifully, the air being cool and damp at the time. I watched the nest for nearly an hour, but saw nothing of the parent birds. As a cold rain storm began soon after and lasted through the following night I con-

cluded that the young Flickers would speedily die, but on the morning of July 1, when I next visited the nest, all five proved to be alive and vigorous. They had more than doubled in size, and were well feathered on the head and body, while their quills and tail feathers were sprouting and their eyes were wide open.

I now noticed for the first time that their upper mandibles were broadly tipped with ivory white. This so exactly resembled the hardened, spur-like process which enables young birds of most, if not all, species to chip their way out of the shell, and which they often retain for several days after hatching, that it was not until after I had taken several of the Flickers from the nest and passing my finger along the bill found its surface absolutely smooth, that I became convinced that the white tipping was merely a color marking and not an excrescence.

Another feature equally conspicuous and common to them all was a whitish gland-like swelling or process on each side of the lower mandible at its base, of about the size of the half of a small pea. All five birds already showed conspicuous black or blackish 'moustaches,' paler, however, in two individuals than in the other three.

On June 23, when the young Flickers were naked and blind, they made a low, penetrating, hissing sound whenever I shook the stump or rattled the bark on the outside. This experiment, repeated July 1, elicited an outcry so loud as to be distinctly audible thirty yards or more away from the tree, and in general effect strongly suggesting, if not also resembling, the clatter of a mowing machine. I afterwards made the direct comparison when a mowing machine was working near the tree and found the two sounds strikingly alike. This clamor, once fairly started, would be kept up for a minute or more and would then gradually die away.

I spent the greater part of July 6 and 7, and most of the afternoon of the 9th, watching this nest. During these three days I saw only the male parent. Probably the female had been killed before my vigils began, although once when the male was calling near the nest, he was answered by another old Flicker, which was apparently in the same tree, but which I did not see. At first the male was very much afraid of me and would not go to the nest while I was near it, but he gradually became accustomed to

my presence, and when I concealed myself partially under a small canoe tent, he would visit the nest while I was sitting in the canoe almost directly beneath it. Thus from a distance of less than fifteen feet, I watched him feed the young. The operation was performed as follows.

The parent returning, after an absence of from eighteen or twenty to sixty minutes, would first alight in the upper part of the cluster of maples among dense foliage. If everything was quiet below he quickly and silently descended and perched on the edge of the hole, sometimes alighting there, but oftener striking against the trunk lower down and running up. If, on the contrary, he saw or heard anything to arouse his suspicions, he approached slowly and with great caution, taking short flights or scrambling backwards down one of the trunks, keeping behind it, occasionally peeping out or down at me, and frequently uttering a few notes of the usual laugh, giving them slowly and somewhat disconnectedly in a peculiar, soft, musical tone. He also uttered a call which I do not remember to have heard before, a low anxious *woi* or *wó-ă*, addressed, apparently, to the young, for they invariably and instantly answered it by a burst of their usual clamor. Occasionally the *woi* cry would be given several times in succession, and would then run directly into the laughing call.

At the first rattle of their parent's claws on the outer surface of the stump, the young appeared at the top of their burrow, and five pink-lined, wide-opened mouths clamored loudly for food. Standing on the edge of the hole, the parent selected one—usually the nearest, I thought—and bending foward and down drove his bill to its base into the gaping mouth which instantly closed tightly round it, when the head and bill of the parent were worked up and down with great rapidity for from one to one and one half seconds (timed with a stop watch), the young meanwhile never once losing its grasp, although its poor little head was jerked up and down most violently.

The first or entering downward thrust of the parent's bill was a veritable stab, the bird apparently striking with all his force and as if with the design of piercing his offspring to the vitals. The subsequent up-and-down motions were rapid, regular, and not unlike those of a Woodpecker engaged in drumming. They

also suggested the strokes of a piston. They were always accompanied by a marked, equally rapid, and apparently corresponding twitching of the tail and hinder parts of the body, and a slighter movement of the wings.

As already stated, the contact of the bills lasted from one second to a second and a half. At its termination the parent would suddenly resume an erect position and look keenly around, at the same time opening and shutting his bill, running out his tongue, and working the upper portion of the throat slightly. This action puzzled me at first. It looked as if the bird were first tasting and afterwards swallowing something which had been obtained from the mouth of the young. After watching the performance many times I came to the conclusion that it was for the purpose of regaining small particles of food which, failing to lodge in the throat of the young, had adhered to the outside of the parent's bill. On one occasion I distinctly saw the old bird, while thus tasting, drop or rub off something from the tip of the bill, and then bending forwards pick it up from the top of the stump and swallow it. The object looked like a large black ant.

If interrupted during the pumping process, as the bird occasionally was, by some motion or noise that I made, it would often feed the same young twice or even thrice in succession, but this never happened when the first period of contact was of normal length.

After resting and tasting for a moment, the parent would again bend forward and for a brief space regard the circle of gaping mouths attentively, evidently hesitating which to take next. The choice made, the operation just described would be exactly repeated. Four young were usually fed at each visit, but sometimes only three, and once but one. When the number was less than four, I think the bird took some alarm and starting off thought it not worth while to return. In no instance were more than four young fed. Whether or no the fifth was served first at the next visit, I had no means of determining.

The time which the old bird spent at the nest rarely exceeded half a minute. On leaving it he always flew straight off over the open fields to a distance of at least a quarter of a mile, beyond which I lost sight of him behind some trees. His return was

made with equal regularity, by way of an orchard which extended down to the landing from the neighboring hillside, and so stealthily that I rarely saw him until he came into the tree, and sometimes not until he appeared at the nest. His bill was always closed up to the moment of contact with that of the young first selected, and I could detect no enlargement of the throat or other evidence that his mouth contained food. In fact it was clear enough that he *swallowed* all the food obtained during these trips and afterwards supplied it to the young by a process of *regurgitation.* What this food consisted of, I can only conjecture, for I did not succeed in finding any of it in the nest or adhering to the bills of the young, and I could not bring myself to kill one of the latter and settle the point in that way.

On the morning of the 6th I found the young for the first time clinging to the walls of their cell, about midway between the bottom and the top. Later in the day, they showed their heads at the opening when the parent came to feed them, and on the 7th they spent most of their time peeping out over the rim with evident curiosity and interest, and once two climbed quite outside. When a boat appeared, or there was any sudden noise, they would all instantly and silently slip back out of sight. On the 7th and frequently afterwards I heard them tapping impatiently on the interior of the old shell.

At six o'clock of the evening of the 9th, I looked into the nest and counted all five of the young. They seemed to be fully grown and perfectly feathered. They were colored precisely alike, as far as I could see, and all had the black moustache as extensive, deeply colored and conspicuous, as in mature males of their species. The white tipping of the bill had been diminishing for several days and on this evening I noticed that two or three birds had almost wholly lost it, while in the others it was confined to the extreme end of the bill.

Four of the young had left the nest when I next visited it on the forenoon of July 10. The fifth bird was still in the hole at five o'clock that afternoon, but at three P. M. the next day I found him perched on one of the upper branches of the tree, calling *ki-u* much in the manner of an old Flicker, but in feebler tones. This cry was regularly answered by another young bird in the orchard behind, and from at least two places across the river.

Evidently the young had already become somewhat scattered. I heard them again on the following day, after which they disappeared.

The nest was left in a very foul state, the bottom being a disgusting mass of muddy excrement, alive with wriggling worms. Apparently the Flicker does not remove the excrement of its young. These young, however, managed to keep very clean, and appeared to be perfectly free from vermin.

No one, apparently, has previously observed, or at least reported, that the Flicker feeds its young by regurgitation. Nor do I find on record anything definite or satisfactory regarding the manner in which the young of the other Woodpeckers are fed before they leave the nest. This would be somewhat remarkable were it not that any attempt to pry into the family secrets of all birds that build in holes is attended with great difficulties. The difficulties can be overcome, however, by the exercise of a little patience and ingenuity, and it is to be hoped that some one who possesses these qualities, as well as the opportunities for applying them, will give the matter close attention, for it both invites and demands thorough investigation.

ON THE OCCURRENCE OF CERTAIN BIRDS IN BRITISH COLUMBIA.

BY WILLIAM BREWSTER.

AMONG some birds taken in British Columbia by Mr. Allan C. Brooks, and now in my collection, are the following, several of which do not appear to have been previously reported from the Province just named.

1. **Falco sparverius deserticolus.** DESERT SPARROW HAWK.—Three specimens, a male and two females, all taken at Chilliwack.

2. **Picoides americanus alascensis.** ALASKAN THREE-TOED WOODPECKER.—A female Three-toed Woodpecker, labelled as having been obtained on the "Summit of the Cascade Mountains, 8 miles north of Mt. Baker," September 8, 1891, agrees so perfectly with descriptions of

P. a. alascensis that I do not hesitate to refer it to that form, of which, however, I have no examples at hand for direct comparison. Mt. Baker is in Washington. The distance in an air line from its summit to the northern boundary of the United States is about twenty miles, but if, as is probable, Mr. Brooks measured his "8 miles" from the base of the northern spur of the mountain, the locality where his bird was shot would be within the limits of British Columbia. In any case the capture extends the range of *P. alascensis* far to the southward of any region where it has been previously found.

3. **Agelaius phœniceus sonoriensis.** SONORAN RED-WINGED BLACKBIRD.—The collection contains five Red-winged Blackbirds belonging to the *A. phœniceus* group taken at Chilliwack in 1891 on the following dates: Three males, January 9; a female, February 9; and a female March 25. All of these have the bill quite as long and slender as in the most extreme examples of *sonoriensis*. Their close relationship with this form is further shown by the generally brown coloring of the females, in both of which, however, the brown of the upper parts is richer, the streaking of the under parts coarser and blacker, and the brownish saffron tinge of the breast and sides deeper than in my representatives of *sonoriensis* from northwestern Mexico. Despite these differences it is perhaps wisest to call the Chilliwack birds *A. p. sonoriensis*, at least for the present. One thing is certain—they are not *A. phœniceus;* in view of which fact the recent announcement[1] by Mr. Rhoads of the occurrence of *phœniceus* in British Columbia may require confirmation.

4. **Rhyncophanes mccownii.** MCCOWN'S LONGSPUR.—Mr. Brooks has kindly given me the following account of his detection of this Longspur in British Columbia: "My first specimen, an adult male in full plumage, was shot on the 2d of June, 1887. At about the same time several years afterwards I took two females on the very same spot. I passed this place every day but saw no others, either there or elsewhere in British Columbia." One of the females just mentioned is now before me. It is an adult bird in rather worn plumage, and is labelled "Chilliwack, June 2, 1890." Mr. Fannin includes this species in his list on Mr. Brooks's authority.

5. **Lanius ludovicianus gambeli.** CALIFORNIA SHRIKE.—A Shrike taken at Chilliwack April 9, 1888, resembles *L. excubitorides* in the clear and nearly immaculate white of its under parts, but above is quite as deeply colored as are dark extremes of *L. l. gambeli*. This combination, with the possession of a bill larger than is often found in either of the forms just mentioned, gives it a remarkably close superficial resemblance to *L. ludovicianus*. As it is scarcely within the bounds of possibility, however, that the last-named form can ever stray so far to the westward, it seems best to refer this puzzling bird to *L. l. gambeli*. It is, I suppose, one of the specimens mentioned in Mr. Fannin's list under the name *excubitorides*.

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[1] Proc. Acad. Nat. Sci. Phila., 1893, p. 47.

THE *VIREO HUTTONI* GROUP, WITH DESCRIPTION OF A NEW RACE FROM VANCOUVER ISLAND.

BY SAMUEL N. RHOADS.

IN 'The Auk' for January, 1893, I referred to the specimens of *Vireo huttoni* taken on Vancouver Island, British Columbia. as follows: "*Vireo huttoni obscurus*. Anthony's Vireo. This may be considered a rather rare visitor on Vancouver Island. I secured one near Victoria. This specimen, also two secured on the same spot by Mr. Maynard in 1891, and which I had the privilege of examining, belong to the strongly characterized race of *Vireo huttoni* proposed by Mr. A. W. Anthony in 1890."[1] Since the publication of this I have had frequent correspondence with Mr. Anthony regarding the real status of his *V. h. obscurus* and have received the skins upon which his original description is based. These skins differ so essentially from the Vancouver Island birds, and so slightly from typical *huttoni* then available for comparison, that it was decided to make a more thorough examination. Through the kind offices of Messrs. Ridgway and Allen, on behalf of the Smithsonian Institution and the American Museum of Natural History, and by the courtesy of Mr. William Brewster, I have been able to examine in all a series of 81 skins of the *Vireo huttoni* group. The whole series may be listed as follows:—

Vireo huttoni Cass.

Humbolt Bay,	Cala.,	1	Riverside,	Cala.,	4
Nicasio,	"	20	Santa Barbara,	"	1
Napa Valley,	"	1	Temescal,	"	1
San Francisco,	"	1	San Gabriel,	"	1
Oakland,	"	3	Berycssa,	"	1
Berkeley,	"	2	Alhambra,	"	4
Mt. Diablo,	"	1	Santa Ysabel,	"	4
Wilson's Peak,	"	1	"Mexico" (?)		1
Santa Cruz Island,	"	1			

[1] Zoe, Dec. 1890, p. 307.

Vireo huttoni stephensi Brewst.

Santa Catalina Mts., Ariz.,		2	Mina Abunda, Chihuahua,		1
Huachuca Mts.,	"	3	Jesus Maria,	"	3(?)
Santa Rita Mts.,	"	3	Bravo,	"	1
Bacadehuachu, north'n Sonora		1	Carmen,	"	1(?)
Triumfo, Lower Cala.		1	Pinos Altos,	"	1
Sierra de Laguna, Lower Cala.		9			

Vireo huttoni obscurus, Anth.

Beaverton, Oregon,		1	Salem, Oregon,		1

Vireo huttoni insularis subsp. nov.

Victoria, Vancouver Isl. 3

Three winter specimens from Chihuahua are of questionable identity. I have placed them under *stephensi*, but they are possibly stragglers, driven by stress of weather from the habitat of true *huttoni*. The rest of the specimens are as easily separated by their geographic range as by measurements and plumage, *stephensi* showing an unusual scarcity of intermediates for a subspecies, and the usual variation due to sex, age, and season being so slight in the whole group as to make their classification a comparatively easy task. When compared with a series of true *huttoni* from localities within a radius of a hundred miles of Monterey where Cassin's type was taken,[1] Mr. Anthony's Oregon birds show no characters which make them separable from darker examples of that series. Mr. Anthony, after making more extended comparisons than he was able to make previous to his published description of *obscurus*, had already expressed to me some doubt as to its validity, and as it does not prove to be intermediate between *huttoni* and Vancouver Island specimens, *Vireo huttoni obscurus* will have to be ignored, and another name given the insular form. I would propose the following.

Vireo huttoni insularis, subsp. nov. VANCOUVER VIREO.

Types, ♂ and ♀, Victoria, British Columbia, Feb. 12, 1891, Provincial Museum collection, A. J. Maynard, collector.

[1] Proc. Acad. Nat. Sci. Phila., 1851, p. 150.

Subsp. char. Colors as in *Vireo huttoni*, but much darker, being uniformly shaded over the whole plumage with a sooty suffusion. The olivaceous buffy tints of *huttoni* nearly obsolete in *insularis*. Average measurements slightly less than those of *huttoni*. Sexes alike. Young, in nesting plumage, of similar color to *huttoni*.

Measurements of the entire series were made in millimetres, according to the system used by Mr. Ridgway in his 'Manual,' except that all bill measurements were taken with dividers from pit of nostril to tip of upper mandible.

		Wing	Tail	Bill
Vireo huttoni,		60 (58–62)	50 (48–52)	6¼ (5¼–6¾)
" "	stephensi,	65 (63–68)	52 (49–54)	6¾ (6 –7¼)
" "	obscurus,	60 (60–61)	49 (48–50)	6¼ (6 –6¼)
" "	insularis,	61 (61–61)	49 (48–50)	5¾ (5¼–6)

The favorite habitat of Hutton's Vireo and its conspecific allies agrees closely with the sparsely wooded areas where the oak belt overlaps the pine belt, and ranges in conformity with these floral conditions from the sea level in the north to elevations of several thousand feet in more tropical latitudes. The series in my custody shows that this species is resident wherever found, and, with two or three exceptions only, specimens taken south of the United States in winter do not show close enough affinity to true *huttoni* to indicate there is any migration of the northern forms into Mexico or Lower California. It is interesting to note that the oaks, so characteristic of the Pacific coast region, terminate rather abruptly at the Columbia River, and, so far as I have personally investigated the subject, are not found in the State of Washington.[1] On the island of Vancouver, a species of oak (*Quercus garryana*) reappears, and, according to Prof. Macoun, its range in British Columbia is locally restricted to the southern part of that island.

We find here a reproduction of all those conditions which seem so indispensable to the presence of Hutton's Vireo in the south. When we add to this the climatic conditions which have been so notoriously conducive to the development of dark races on the Northwest Coast, with the isolation of *insularis* from the nearest habitat of *huttoni* and its permanent residence on the island, its differentiation becomes almost a foregone conclusion.

[1] "California to Oregon and British Columbia." Sereno Watson, Geol. Cala., Vol. II. "San Francisco Bay to Puget Sound," Green and Kellogg in W. Amer. Oaks.

The habitat of each member of the group may be now quite closely defined.

Vireo huttoni. — (Californian.) Pacific slopes of the West Cascade and Sierra Nevada Mountains to the coast, and from the Columbia River to Lower California, including the near-by coast islands. Occasionally wandering into northern Mexico and Lower California in winter.

Vireo huttoni stephensi. — (Lower Sonoran.) Mountain ranges of the Sierra Madre and Sierra de Laguna from the Gila River and southern California south to the 28th parallel, and from the Rio Grande to the Pacific Ocean.

Vireo huttoni insularis. — (Boreal.) Coextensive with range of *Quercus garryana* on Vancouver Island, British Columbia.

SOME ADDITIONS TO THE AVIFAUNA OF NORTH CAROLINA, WITH NOTES ON SOME OTHER SPECIES.

BY C. S. BRIMLEY.

DURING the past five years I have endeavored to gain what information I could in regard to the occurrence of the rarer North Carolina birds, and am now able to add several to the list of species hitherto found in the State, as well as to offer some further facts concerning other species already recorded from North Carolina.

The following notes are based on observations made by my brother, H. H. Brimley, and myself, and on those of Messrs. J. S. Cairns, of Weaverville, Buncombe County, and Thomas A. Smithwick of Bertie County.

ADDITIONS TO THE AVIFAUNA OF NORTH CAROLINA.

Glaucionetta islandica.— Among the specimens which were purchased by the State to exhibit at Chicago was a Goldeneye, mounted at New Berne in 1892 and said to have been taken near that place. The white of

the wing is divided by a dark bar; the white spot in front of eye reaches the base of the bill; the gloss of the head, however, is green, but seen in one particular light looks purplish.

The very day my brother told me he had tried to identify the above specimen and thought it was probably *islandica*, I received a letter from Mr. Cairns in which he said he had shot a Duck he thought was *islandica*. In a later letter he described it as follows: head purple or wine-colored; white space in front of eye joining the bill at lower mandible and following the bill three fourths of an inch; white on wing divided by black bar; back black; breast pearly white; length 19 inches; sex male; taken in Buncombe Co., February, 1893.

Hæmatopus ostralegus.—Several exhibited at the New Berne fair, in February, 1892, said to have been killed in the vicinity.

Archibuteo lagopus sanctijohannis.—Seen occasionally in spring and winter in the mountains (J. S. Cairns).

Nyctala acadica.—A mounted specimen was exhibited at New Berne in February, 1892, which was said to have been killed near there.

Empidonax flaviventris.—One female taken Aug. 11, 1890, near Weaverville by J. S. Cairns.

Quiscalus quiscula æneus.—Five taken in Buncombe County, March 16, 1890, by J. S. Cairns. I took one male at Raleigh Nov. 26, 1892.

Calcarius lapponicus.—One taken at Raleigh Jan. 13, 1893, and another the following day. Both were in company with Prairie Horned Larks.

Ammodramus henslowi.—One female taken at Weaverville, by J. S. Cairns, April 19, 1890.

Dendroica dominica albilora.—A female was taken at Weaverville in April, 1891, by J. S. Cairns.

ADDITIONAL NOTES ON SPECIES ALREADY RECORDED FROM NORTH CAROLINA.

Colymbus holbœllii.—Exhibited in the flesh at the New Berne fair in 1892 and 1893.

Urinator imber.—One was taken at Raleigh, on the waterworks pond, Nov. 17, 1887.

Larus philadelphia.—One was taken by Mr. B. M. Moore in Franklin County, in December, 1889, and was brought to us to be mounted.

Hydrochelidon nigra surinamensis.—Taken at Raleigh July 28, 1884; also in 1888, and on Sept. 22 and 23, 1892; all on the old carp ponds.

Pelecanus erythrorhynchos.—A pair were taken on the French Broad River in 1888 (Cairns).

Oidemia deglandi.—One was exhibited at the New Berne fair in 1892 and several in 1893. Two taken near Beaufort Jan 25, 1893.

Oidemia perspicillata.—The commonest Duck in the New Berne market in February, 1893.

Tantalus loculator.—About the time that one was killed near Garners in July, 1884, I heard accounts of a number being seen nearer Raleigh, though I never saw any myself. They have never appeared since.

Ardea cœrulea.—It usually occurs at Raleigh in July in the white plumage and is sometimes not uncommon.

Nycticorax violaceus.—An adult was exhibited at New Berne in 1892, and an immature specimen in 1893, both said to have been taken near that place.

Porzana noveboracensis.—Two were exhibited in the flesh at the New Berne fair in February, 1892.

Tringa maculata.—Common at Raleigh in March and April, 1889, also a few in 1892, and twice observed in March, 1893.

Totanus melanoleucus.—Of irregular occurrence at Raleigh in spring like most of our Sandpipers, but observed in more years than any except the Spotted and Solitary Sandpipers. Like all the others it was commonest in 1889, since which year our Sandpipers have visited us less than previously.

Bartramia longicauda.—Common at Raleigh in April, 1887 and 1888, and rare since then.

Falco columbarius.—A male and a female were taken at Raleigh, April 21 and 23, 1888.

Strix pratincola.—One was killed near New Berne, Feb. 25, 1892.

Asio wilsonianus.—One taken at Raleigh, Feb. 19, 1891.

Sayornis fuscus.—Tolerably common in winter, but very rare in summer, near Raleigh. I have known of only one pair breeding near Raleigh and they have done so only in the last two years, nesting in an old well within a few yards of our back porch.

Otocoris alpestris.—Common at Raleigh during December, 1886, and January, 1887, but not observed since.

Otocoris alpestris praticola.—Common at Raleigh in December, 1886, and January, 1887, in company with smaller numbers of *alpestris*. It also occurred in January, 1893, in small numbers.

Spinus pinus.—Common at Raleigh during the winters of 1884–85, 1886–87, 1887–88, 1889–90; but almost entirely absent during the winters of 1885–86, 1888–89, 1890–91, 1891–92, 1892–93.

Ammodramus henslowii.—A female taken at Raleigh, April 25, 1893, is our first record for this locality.

Chondestes grammacus.—One taken and another seen at Raleigh, Aug. 19, 1889. We also took a nest and set of four eggs, July 24, 1890.

Zonotrichia leucophrys.—One taken at Weaverville by J. S. Cairns, Oct. 16, 1889.

Petrochelidon lunifrons.—Tolerably common at Raleigh during the spring migration in 1889 and 1891.

Clivicola riparia.—One taken by us at Raleigh, April 25, 1888.

Stelgidopteryx serripennis.—Has apparently been getting rarer near Raleigh, or else has found nesting places more suited to its needs than

the old ones, for it has deserted its old haunts almost entirely, and instead of being our commonest Swallow is much more nearly our rarest one.

Protonotaria citrea.—Rather rare summer visitor in Bertie County; eight specimens taken from July to September, 1891; two specimens taken in 1892 (T. A. Smithwick).

Helminthophila chrysoptera.—One male taken at Raleigh, May 7, 1889, and another on the same date in 1891.

Helminthophila peregrina.—One taken at Raleigh on each of the following dates: Oct. 6 and 12, 1887; Oct. 12, 1888; Sept. 19, 1889; all were females.

Dendroica cærulea.—A female taken May 8, 1893, is our first spring record for this species at Raleigh.

Dendroica palmarum hypochrysea.—Occurs at Raleigh sparingly in the fall migration, and occasionally during the winter months, and is sometimes fairly common in the spring. I have seen this subspecies only.

Geothlypis formosa.—Saw an old bird feeding young near Milburnie some eight miles from Raleigh, June 27, 1890.

Sylvania mitrata.—Common summer visitor in Bertie County, breeding abundantly (T. A. Smithwick).

Harporhynchus rufus.—Resident at Raleigh, though rather rare in winter. Even during the severe winter of 1892–1893 I have seen them on a number of occasions. Very common in Bertie County in January, 1893.

Thryothorus bewicki.—Occurs regularly, but rarely, in winter at Raleigh. I have seen them about once a week during every winter since 1885, but never more than one at a time except on one occasion.

Sitta canadensis.—Irregular winter visitor at Raleigh, usually rather common; none observed during the winters of 1887–88 and 1891–92.

Galeoscoptes carolinensis.—Observed twice in winter at Raleigh in the past five years. Mr. T. A. Smithwick has seen a dozen or more in Bertie County during January, 1893.

Turdus aliciæ.—Irregular transient at Raleigh; usually from one to four are taken every year.

FLY LINES.

BY GEORGE H. MACKAY.

'FLY LINES' and 'Lines of Flight' are so closely connected that it might seem reasonable to include them under one heading. Yet, judging from my observations of some of the water birds during their sojourn on the New England coast, I can say that Fly Lines do not convey to me the same meaning as do Lines of Flight, for the reason that the former appear to be influenced by the peculiar local surroundings and weather conditions of the locality where they occur, while I recognize as Lines of Flight those general migratory movements from north to south, and vice versa, over particular sections of the country or along certain coasts, in contradistinction to other portions where such movements do not occur. While it is true that in some instances Lines of Flight seem to change their character *temporarily* so as to very properly come under my interpretation of Fly Lines, I can scarcely say I have ever noticed Fly Lines (with one exception) to assume the definite character so distinctive of Lines of Flight during a migratory movement. I am free, however, to state, in regard to the above exception, that I have observed Scoters flying under the temporary local conditions of Fly Lines which I am certain embraced a migratory movement, as I shall have occasion to instance later on. It is of little importance, however, as far as the subject matter is concerned, whether one or both terms are considered as essential in defining such movements. Therefore permit me to use that of my title in describing what I desire to communicate, because it is the one with which I am most familiar.

The expression 'ocean lanes' is often applied to those invisible, broad, open ways traversed by the ocean steamships in passing to and from this country to Great Britain, and it seems fairly well to convey the meaning. Fly Lines are also invisible pathways, pursued not only by migratory but by sojourning water birds in New England. This unmarked temporary way is always subject to change, sometimes more than once in a day, as it is determined largely by weather conditions; but whatever the conditions,

when such a Fly Line is adopted, the birds will undeviatingly follow it, flock after flock, though no coming birds can be seen when the last flock is passing out of sight. As illustrations must necessarily be repetitions, they being much alike, I shall confine myself to only a few species out of a number which have come under my observation.

It took me a number of years to learn what Fly Lines were, or that there were such, or to recognize in them a regularity of movement under varying conditions. Afterwards I found it of great service during my shooting trips. I have heard people who had not given the subject especial attention express the view that birds in general fly aimlessly about, securing sufficient food for their daily wants, and getting out of harm's way when necessary. I can scarcely agree to such an opinion, my observations leading me to conclude that birds display a purpose in everything; it seems to me only necessary to study their habits to become convinced of this. Those who have had more or less experience as sportsmen on the coast find it not a difficult matter, in most cases, to distinguish, when far distant, species with which they are familiar by their appearance, manner of flight, and note, for each is characterized by ways and traits peculiarly its own, a knowledge of which often enables one to anticipate their movements. Notice, for example, a flock of Brant (*Branta bernicla*) gyrating in the air on some warm April or May day when the wind is southwest; does it mean anything? If you have studied them you will know that soon they will start on their line of migration, this first movement being indicative of the one which follows it. Should the early morning find you on the sea coast at the proper season and place, you will observe that the first few flocks of Scoters appear to pass in about the same line and headed in the same direction, as if moving from one definite point to another; and you will find that *this* will be their Fly Line while the same weather conditions prevail. It may seem that chance has so directed them, but wait and see, and you will become convinced that such is not the case. I have known these Scoters, when flying by the south side of Nantucket Island, at some distance from the shore, to change their course at a fixed though invisible point and turn in towards the beach at a given spot, and that all succeeding flocks would follow this line although none might be

in sight at the time the last flock passed. To many it would seem wild to wager that the next flock to appear would do likewise, yet such could be predicted with reasonable certainty, for it was their Fly Line for the time being.

I have also noticed flocks of American Golden Plover (*Charadrius dominicus*) leading along the headland on Nantucket Island, adjacent to the beach, until they reached a certain place on the shore, when their course would be abruptly changed, turning inland, without any apparent cause. At other times I have seen flock after flock lead inland and, on reaching a certain point, turn off and follow a slight, scarcely noticeable, depression in the land. As I interpret it, they pursued these courses in each instance because it was their selected Fly Line while passing from one portion of the island to another. Should they mount up into the air and circle several times, and then head south, you may say goodbye to that flock for at least a year, for they have started on their line of migration, this second movement being certain to follow the first.

Seconnet Point, Rhode Island, is separated from the Newport shore by the Seconnet River, which at its mouth is four and a quarter miles wide. I have here watched many migratory movements of the three varieties of Scoters in the spring as they passed on their lines of flight northward. When the wind is southwest, whether blowing hard or almost calm, at a certain undefined place off the Newport shore they will turn and pass on up the river for a mile or more, then again turn and come out around Seconnet Point, resuming here their regular line of flight as before. There is no apparent reason why they should adopt this out of the way course, rather than the straight one directly across the mouth of the river, which would be their direct line of flight; yet do this they will, and for the time being it seems to be their adopted Fly Line under the conditions as stated, but not otherwise. I instance this to explain what I intend to convey by lines of flight changing their character temporarily into Fly Lines. The same is true of the Golden Plover (*Charadrius dominicus*) at times when they pass over Nantucket Island without stopping. The American Crow (*Corvus americanus*), Black-bellied Plover (*Charadrius squatarola*), Knots (*Tringa canutus*), Turnstones (*Arenaria interpres*), Eskimo Curlew (*Numenius*

borealis), Hudsonian Curlew (*N. hudsonicus*), the Greater Yellowlegs (*Totanus melanoleucus*), Yellowlegs (*Totanus flavipes*), also some of the land birds, and many of the Ducks, as the American Eider (*Somateria dresseri*), Oldsquaw (*Clangula hyemalis*) and others, when sojourning in a locality, and at times during migration, follow a definite Fly Line.

To exactly define the Fly Line of sojourning birds is not always easy, for, as I have remarked, each day is a rule unto itself according to the prevailing weather conditions; it therefore may require a longer or shorter period of observation, but when it is known to the experienced sportsman the birds are very apt to suffer. Temporary Fly Lines which may form a part of lines of a migratory flight, as also lines of flight proper, are comparatively easy to ascertain, being in almost all instances governed by wind and weather, but not invariably so. Fly Lines of sojourning birds are not seemingly always governed by the weather conditions, the objective point sought sometimes causing exceptions by reason of location, nearness to buildings, intervening hills, etc. It might appear, on viewing some large marsh where all was apparently good ground, that one location would be as favorable as another for the birds to fly over; such a conclusion would be a mistaken one, for though it may have an area of a thousand acres there may be only two or three places that can be called *good*, for the reason that, owing to its topography, direction of wind, etc., conditions may arise which may cause Fly Lines to touch only in certain places, other portions of the marsh being passed over but little by the birds. To the inexperienced it is again merely chance which directs such movements of birds, but the close observer sees purpose, and, the cause being known, the result can be predicted.

Why is this? And what is it that causes the above results? As my explanation must necessarily be based on my individual experience, which, while it has covered a number of years on the coast, is nevertheless only the result of one person's observations, which may or may not be modified by more extensive data, I am compelled to present an explanation which is not altogether satisfying even to myself. Consequently I offer it simply as a contribution to a subject on which little thus far has been written.

It would seem, especially during inclement, windy weather, that most creatures shrink from a struggle with the elements, for a variety of reasons; as a result their movements are deflected to leeward. But such conditions are not essential, for I have noticed similar results during ordinary weather when there was but little wind, the position of the Fly Line being changed perceptibly. Such changes are apparently brought about by the wind coming from a different quarter, the Fly Line being deflected almost invariably to leeward, even though there may be scarcely wind enough to make a ripple on the water. I interpret it that the birds are enabled to fly in the direction they wish to go with greater ease by so changing their course. It would also seem that some sojourning birds, after becoming accustomed to certain localities, evince a preference for particular routes by their continuous use when passing to and from places they are accustomed to frequent, thus adopting what I designate as their Fly Line. In instances where salt water Ducks are in the habit of frequenting ponds having an opening into the ocean, they usually show a preference for passing in and out over such opening, apparently feeling safer when flying over the water. Should there be no opening they are apt to select the narrowest part of the beach separating the pond from the ocean, over which to cross, regardless of the wind. The topography of certain localities also has much to do with influencing the direction of the Fly Lines of some of the water birds when passing over the land. The American Golden Plover (*Charadrius dominicus*) especially will follow undulations, and shape its course so as to follow the depressions and valleys. These illustrations, I think, indicate that the movements of some of the water birds are not left to chance, but actuated by purpose.

It is not to be inferred that Fly Lines are easily discovered, though sought after with perseverance, for the reason that their location, favorable weather conditions, and time of flight, are usually matters of conjecture; hence unless one is a good deal in the field, as well as on the alert, instances may occur which will escape the observer's notice. In thus directing attention to the subject, and communicating what I have gleaned, I desire to assist others who may be interested in the matter by giving them the aid of my own experience.

THE GEOGRAPHICAL DISTRIBUTION OF THE GENUS *MEGASCOPS* IN NORTH AMERICA.

BY EDWIN M. HASBROUCK.

IN the earlier accounts of travel and exploration in this country the little Screech Owl is referred to by nearly every writer on natural history. In 1758 Linnæus described and named the Red Owl *Strix asio*, and it remained for many years the sole known representative of the genus *Megascops*. Later birds closely related to this species were found in various quarters of the globe, until now the genus may be said to have an almost cosmopolitan distribution.

In 1832 it was discovered that material differences existed between the birds of the eastern United States, and those from the southwest, the latter being described as the Mexican Screech Owl (*Scops trichopsis*). In 1854 a further separation occurred when the Texan form (*Scops mccallii*) was described. Since the discovery of the Texan race, ornithologists have come to recognize more and more the importance of faunal areas, and the evident relation to them of peculiar local forms. *M. asio* has been divided into so many subspecific forms that there appears to be absolutely no region left (in this country) from which a valid form is likely to be described. So complicated and so little understood is the group, that up to the present time no attempt has been made to define the geographical distribution of its numerous forms. Future data must necessarily make some changes in the details of distribution as here mapped, particularly in the case of southern species which as yet are little known, but with these exceptions it is hardly probable that any material differences will be effected.

The persent paper includes all members of the *Megascops* group known to occur north of Panama, a total number of twenty-one[1] forms, of which ten are full species, and eleven subspecies, as follows.

[1] Three forms recently described by Brewster, *aikeni*, *macfarlanei*, and *saturatus* have not as yet been admitted to the A. O. U. list of North American birds, but are included here as they appear to rest on a good basis.

Megascops barbarus (*Scl. & Salv.*).
Megascops nudipes (*Vieill.*).
Megascops cassini (*Ridgw.*).
Megascops cooperi (*Ridgw.*).
Megascops brasilianus guatemalæ *Sharpe.*
Megascops hastatus *Ridgw.*
Megascops vermiculatus *Ridgw.*
Megascops aspersus *Brewst.*
Megascops vinaceus *Brewst.*
Megascops asio (*Linn.*).
Megascops asio floridanus (*Ridgw.*).
Megascops asio mccallii (*Cass.*).
Megascops asio bendirei (*Brewst.*).
Megascops asio kennicottii (*Elliot*).
Megascops asio maxwelliæ (*Ridgw.*).
Megascops asio trichopsis (*Wagl.*).
Megascops asio aikeni *Brewst.*
Megascops asio macfarlanei *Brewst.*
Megascops asio saturatus *Brewst.*
Megascops flammeolus (*Kaup*).
Megascops flammeolus idahoensis *Merriam.*

Of these, nine are strictly Mexican and Central American.

Megascops barbarus (*Scl. & Salv.*).
Megascops nudipes (*Vieill.*).
Megascops cassini (*Ridgw.*).
Megascops cooperi (*Ridgw.*).
Megascops brasilianus guatemalæ *Sharpe.*
Megascops hastatus *Ridgw.*
Megascops vermiculatus *Ridgw.*
Megascops aspersus *Brewst.*
Megascops vinaceus *Brewst.*

While the remaining twelve are to be found within the territory of the United States, three of the latter, *Megascops asio trichopsis*, *Megascops asio mccallii*, and *Megascops flammeolus*, are found also in Mexico, leaving nine that may be considered North American in the generally accepted sense of the term.

It is a noticeable fact that, of the nine forms strictly Mexican and Central American, only one, *Megascops brasilianus guate-*

malæ, is a subspecific one; while on the other hand, of the nine strictly North American forms, only one, ***Megascops asio***, is specific. This is possibly due to the fact that the northern birds have been more thoroughly studied than have the tropical ones, and while much work has been done in this latter region, so many localities remain to be explored that the future may show an entirely different state of affairs.

If we compare the map of distribution with the faunal areas, it will be seen that the range of several of the subspecies coincides very closely with the boundaries of certain faunas (a fact particularly noticeable in the United States), while others are distributed over an area embracing two or more, a circumstance which, viewed from the standpoint of evolution, would go to show that those forms whose range is most widely diffused are the oldest, while those circumscribed within certain life areas have become more recently differentiated.

In treating of the common Screech Owl (*M. asio*), whose wide distribution is so well known, it seems useless to mention records for every State included in its range; accordingly a general statement of distribution accompanied by outlying localities will be sufficient, more especially since the accompanying map shows the territory covered in full. With the remaining forms I shall enter more into detail.

Beginning with our own group, we have: —

Megascops asio (*Linn.*). Common Screech Owl.

This is the most widely distributed of the group, and doubtless the oldest in North America, since the range is extended into four of the principal life areas; namely, the Austroriparian, Carolinian, Alleghanian, Canadian and portions of the Great Plains faunas. No type exists. The species is first mentioned by Catesby in 1731 from the Carolinas, and this term "the Carolinas" will forever have to suffice for type locality. It is found throughout the Eastern United States from the northern portions of South Carolina, Georgia, Alabama and Mississippi northward to southern Canada, and as far west as the central and western parts of Nebraska and Kansas, in which latter region it occurs occasionally along the timbered regions of the bottom lands. In Texas its range is somewhat obscure, inasmuch as one

specimen of a lot from Gainesville was identified as *Megascops asio* proper, and all the remainder as *mccallii*, while Bendire records it from Long Point — so far south that the record is really remarkable, as *floridanus* or *mccallii* would be the more likely forms to occur. With the exception of the Atlantic coast north of Charleston, the species does not occur below the one hundred feet contour line, from which it ranges over the whole area save the higher portions of the Alleghanies.

The following records indicate the boundaries of its distribution.

Newfoundland (Forest and Stream, III, 1874, 53).
Nova Scotia. *Pictou* (Prof. G. W. McQuarrie, personal information).
New Brunswick. *Newcastle* (Phillip Cox, in epist.).
Maine. *Calais* (Geo. A. Boardman, in epist.); *New Vineyard* and *Kingfield* (F. H. Carpenter, Orn. and Oöl., XI, 1886, 177).
Ontario. *Annan* (A. C. Sloam, in epist.); *Bellville* (James T. Bell, in epist.); *Ardtrea* (John Blair, in epist.).
Michigan. *St. Marys* (Morris Gibbs, in epist.); *Keweenaw Point*, (Kneeland, list of 1860).
Wisconsin. *Milwaukee Co.* (O. & O. XIV, 1889, 57); "*northern part*" (Henry Pratten, Rep. Geol. Surv. Wis. Iowa & Minn. 1852, 622).
Minnesota. "*Northern part*" (Henry Pratten, l. c.); *Yellow Medicine Co.*, (Albert Lane, O. & O. XIV, 1889, 57).
South Dakota. *Clay Co.* (G. S. Agersborg, Auk, II, 1885, 284).
Nebraska. *Ong* (Joel Nelson, in epist.).
Kansas. *Ellis* (Dr. Louis Watson, in epist.).
Texas. *Gainesville* (G. H. Ragsdale, in epist., on authority of W. Brewster); *Long Point* (Capt. Chas. E. Bendire, Special Bull. No. 1, U. S. Nat. Mus. 1892, 355).
Mississippi. *Waverly* (G. V. Young, in epist.— possibly *floridanus*).
Alabama. *Greensboro* (Dr. W. C. Avery, in epist.).
North Carolina. *Raleigh* (H. H. & C. S. Brimley, in epist.); *Oakdale* (Robert J. Thompson, in epist.); *Weaverville* (J. S. Cairns, in epist.).
South Carolina. *Chester* (L. M. Loomis, Bull. N. O. C. 1879, 216).

Megascops asio floridanus (*Ridgw.*). FLORIDA SCREECH OWL.

The Florida Screech Owl is confined almost exclusively to the Austroriparian region; and while but little if any value can be attached to it as a faunal race, the fact remains that but a single record has been found within the Carolinian fauna. With the exception of this record — McPhersonville, S. C.— not

a single instance appears to be known of its occurrence at a greater elevation than five hundred feet. It is essentially a bird of the low country, although not found on the Atlantic coast farther north than about Lat. 34°, while in the Mississippi Valley it may go a trifle beyond that, but no data exist for such assumption, and its distribution across this great river basin is to a certain extent hypothetical. The type specimen of this species, deposited in the U. S. National Museum, was described from Indian River, Florida, by Ridgway in 1873. The race occurs throughout the Gulf States to about the southern limit of the preceding, or to about Lat. 33° or 34°. Just how far west it extends is uncertain, but probably to extreme eastern Texas, as it has been taken in De Soto Parish, Louisiana, just over the border. Inasmuch as the Austroriparian region extends into Texas as far west as Long. 98°, it is not improbable that *floridanus* occurs within the limits of this State.

The following are the records of its distribution.

South Carolina. *Charleston* (Arthur T. Wayne, in epist.); *Grahams Turnout* (specimen in U. S. Nat. Mus.); *Mount Pleasant* (spec. in coll. Wm. Brewster); *Macphersonville* (spec. in coll. Wm. Brewster).

Georgia. *Broro Neck* (spec. in coll. Wm. Brewster); *Macon* (spec. in U. S. Nat. Mus.); *St. Simon's Island, Wayne Co.*, and *McIntosh Co.* (H. B. Bailey, Bull. N. O. C. 1883, 41); *Sapelo Island* (spec. in U. S. Nat. Mus.).

Florida. *Gainesville* (spec. in U. S. Nat. Mus.); *Indian River* (type specimen in U. S. Nat. Mus.); *Palatka* (spec. in coll. E. M. Hasbrouck); *Caloosahatchee River* (W. E. D. Scott, Auk, IX, 1892, 132).

Louisiana. *New Orleans* (spec. in coll. Dr. A. K. Fisher); *Mandeville* and *De Soto Parish* (spec. in Am. Mus. Nat. Hist.).

Megascops asio mccallii (*Cass.*). TEXAN SCREECH OWL.

The Texan Screech Owl was described by Cassin in 1854 from Texas, and if the more southern records are to be relied upon (the authority places them almost beyond doubt), the distribution is one of the most peculiar of any of the group. We first meet with it in Texas at Gainesville (an apparently exceptional record); in the vicinity of Houston; in Lee, Tom Green, and Concho Counties, as far west probably as Long. 104°. At Gainesville Mr. Ragsdale records it as uncommon, but it ap-

pears more likely from records of *trichopsis* from Eastland that the Gainesville birds are the Mexican form, but as no proof of this exists, until we have more information the record will have to stand for *mccallii*. Southward the range extends through eastern Mexico, on the basis of one or two records, to La Parada in Oaxaca, and even to the Province of Vera Paz, Guatemala, which last is undoubtedly an extra-limital occurrence. In the United States it apparently does not attain a greater altitude than 2000 feet, while in Mexico near Oaxaca and in Guatemala it is necessarily somewhat greater.

By far the greater number of records for *mccallii* would make it a bird of the Lower Sonoran region, while those from Brownsville, Texas, from Mexico and Guatemala, throw it into the Tropical fauna, its true range probably not extending farther than Oaxaca.

Following are the records.

Texas. *Gainesville* (G. H. Ragsdale, in epist.); *McLennon Co.* ('Elanoides,' O. & O. XV, 1890, 57); *Lee Co.* (J. A. Singley, O. & O. XII, 1887, 164); *Tom Green* and *Concho Cos.* (Lloyd, Auk, IV, 1887, 190); *Bandera Co.* (Ibis, 1865, 330); *Houston* (Rep. Miss. Val. Migra. 1888, 122); *Comal Co.*, (G. B. Benners, O. & O. XII, 1887, 65); *Nueces Co.* (spec. in coll. Wm. Brewster); *Corpus Christi* (Bull. No. 2, Ridgw. Orn. Club, 1887, 15); *Brownsville* (spec. in U. S. Nat. Mus.); *Lomita* (Bull. U. S. Geol. Surv. Terr. V, 1879, 417); *Losoya Crossing* (H. P. Attwater, O. & O. XII, 1887, 124); *Hidalgo* (Sennett, Bull. Geol. Surv. Terr. IV, 40).

Mexico. "*Northern Mexico*" (Lieut. Couch, spec. in U. S. Nat. Mus.); La Parada, Oaxaca (Sclater, P. Z. S. 1858, 296).

Guatemala (Vera Paz). *Salama* or *Cajabon* (Scl. & Salv. Ibis, I, 1859, 220).

Megascops asio bendirei (*Brewst.*). California Screech Owl.

This race was separated by Brewster in 1882, and the type specimen, from Nicasio, California, is now in the Brewster collection. With the exception of its occurrence at Fort Klamath, Oregon, it is confined to California west of the Sierra Nevada range. The State is so broken up as regards life areas that it is not surprising to find it inhabiting four,— Upper and Lower Sonoran, Transition, and Boreal — the last to a limited

extent only. Rarely, if ever, is this Owl found at a greater elevation than five thousand feet, the five thousand feet contour bounding very nicely on the east the records of capture so far as known. The form found in the northwestern part of the State is somewhat questionable, it being either the present race or Mr. Brewster's recently described form *saturatus*. It is hardly probable that the last-named ranges so far south, but for the present, owing to the lack of material, the matter will have to remain in doubt.

The following are the records.

California. *Nicasio* (type spec. Brewster, Bull. N. O. C. VIII, 1882, 31); *San Bernardino*, *Poway*, *Santa Cruz*, *Alameda Co.*, *Contra Costa Co.*, "*the Valleys*" (Land Birds Pacif. Coast, 1890, 51); *San Francisco* (Zoe, II 1891, 167); *Santa Barbara* (C. P. Streator, O. & O. XI, 1886, 69); *Fort Crook* (Townsend, Proc. U. S. Nat. Mus. 1887, 203); *Fort Tejon* (Henshaw, Wheeler Surv. 1876, App. JJ. 226); *Marin Co.*, *Stockton*, *Oakland*, *Riverside*, *Shasta*, specs. in U. S. Nat. Mus.); *Nevada City* (Proc. Bost. Soc. Nat. Hist. XVII, 1875, 365).

Oregon. *Fort Klamath* (Merrill, Auk, V, 1888, 146).

Megascops asio kennicottii (*Elliot*). KENNICOTT'S SCREECH OWL.

Not a single specimen of this bird, so far as known, has been taken since 1867, when Elliot's type (45,847, U. S. N. M.) was described from Sitka, Alaska. Numerous specimens from British Columbia, Washington, Idaho and western Montana have been referred to this race, but a recent subdivision by Mr. Brewster makes the type unique. It is of course boreal in its affinities, and probably occurs in northern British Columbia.

Megascops asio maxwelliæ (*Ridgw.*). ROCKY MOUNTAIN SCREECH OWL.

This was described in 1883 from a specimen sent from Boulder, Colorado, by Mrs. Maxwell, and now in the National Museum. The race is an exceedingly light colored one, frequenting the cottonwood timber along the streams and among the foothills, and appears to be confined to the Rocky Mountain region from southern Montana to central Colorado. Fort Custer, Montana, is apparently the northern limit of this form, although Bendire

(Spec. Bull. No. 1, U. S. N. M., 1892, 355) mentions a Screech Owl taken by Macoun in northwestern Manitoba which he says is "presumably referable to this race." The Rocky Mountain Screech Owl is a bird of the boreal and transition zones, and although no records are known for its occurrence in Wyoming, it undoubtedly is to be found in the central and western portions of the State. The records place it at an elevation not greater than six thousand feet, but as they are extremely scarce it is difficult to give its true vertical range, and it probably occurs in many portions of the State on the eastern slope of the Rockies.

It has been reported from the following localities.[1]

Colorado. *Boulder* (Mrs. Maxwell, spec. in U. S. Nat. Mus.); *Denver* (A. W. Anthony, per Bendire, Auk, 1889, 301); *Boulder* and *Larimer Cos.* (Bendire, Special Bull. No. 1, U. S. Nat. Mus. 1892, 364).

Montana. *Fort Custer* (Bendire, Auk, VI, 1889, 301).

Megascops asio trichopsis (*Wagl.*). MEXICAN SCREECH OWL.

This is the earliest form distinguished from *asio*, and one of the most peculiar in distribution; being found on the peninsula of Lower California, in central Arizona and east to central Texas, and far down the Mexican plateau. Until the present year *trichopsis* was not known east of New Mexico, but recently while examining some material collected by myself in Palo Pinto County, Texas, in 1888, two Screech Owls collected on September 9 were pronounced by Mr. Ridgway to be unquestionably this form, one of them typical. A third specimen, a young bird taken at Lampasas, Texas, on July 3, 1887, also resembles *trichopsis* so much that I have no hesitation in pronouncing it to be the same. These records extend the range of *trichopsis* some three or four hundred miles to the east, making doubtful the true status of some central Texas specimens that have not undergone comparison. In Mexico the only record for this form is at

[1] Mr. L. M. McCormick, who collected in the Black Hills in Dakota the past fall (1892), reports having heard a Screech Owl on several occasions, which he was unable to secure. This is the first instance known of the occurrence of any of the genus from this region. The bird was presumably of this species.

Guanajuato, thus making extremely difficult of delineation the distribution in this country. The Mexican Screech Owl is decidedly Lower Sonoran in its affinities, but on the northern border of its range passes into the Upper Sonoran and Transition, while at Cape St. Lucas it has a tinge of the Lower Californian and Tropical life areas. It appears to range to an elevation of about seven thousand feet, Fort Wingate, New Mexico, being the highest known record in the United States. The records are as follows.

Arizona. *Fort Verde, Picacho Station, Casa Grande, Fort Lowell* (spec. in U. S. Nat. Mus.); *Tucson* (Rhoads, Proc. Phil. Acad. Nat. Sci. 1892, 116); *Fort Mojave* (Bull. U. S. Surv. Terr. VI, 1881, 241, 242); *Bill Williams Fork*,[1] *Camp 118* (P. R. R. Surv. X, 1859, No. 3, 20); *Camp Grant*,[1] *Gila River*[1] (60 m. S. of Apache), *San Pedro*[1] (Henshaw, Zoöl. Wheeler Surv. V, 1879, 406); *Fort Huachuca* (spec. in U. S. Nat. Mus.); *Oracle* (Bendire, Special Bull. No. 1, U. S. Nat. Mus. 1892, 368).

New Mexico. *Fort Wingate* (Spec. in U. S. Nat. Mus.).

Texas. *Palo Pinto Co.* and *Lampasas Co.* (spec. in coll. of E. M. Hasbrouck).

Lower California. *Cape St. Lucas* (spec. in U. S. Nat. Mus.); *Cardon Grande* and *El Rancho Viejo* (Bryant, Proc. Cal. Acad. Sci. Ser. 2, II, 284); *Valladares* (Anthony).

Mexico. *Guanajuato* (spec. in U. S. Nat. Mus.).

Megascops asio aikeni *Brewst.* AIKEN'S SCREECH OWL.

This and the two following forms have been recently described by Mr. Brewster, and while not as yet admitted to subspecific rank, their claim to such appears to rest on sufficiently good basis to warrant their consideration in the present paper. The type specimen now in the Brewster collection was described from El Paso County, Colorado, while a record for "*mccallii*" from La Plata County I have no hesitation in referring to this race.

It is questionable if Aiken's Screech Owl occurs at any point north of Douglas County, Colorado, but it probably inhabits all the more open country along the foothills of the Rocky Moun-

[1] These specimens were originally reported as *mccallii*. Owing to the fact that the specimens from Bill William's Fork (Camp 118) were subsequently deposited in the National Museum and marked *trichopsis*, and also to the strides we have made in the knowledge of distribution, I have taken the liberty to change all Arizona records of *mccallii* to *trichopsis*. It will be readily seen from the map that it is impossible for *mccallii* to occur in Arizona.

tains south at least to central New Mexico and northeastern Arizona.[1]

Aikeni is unquestionably a bird of the Transition zone with little probability of its occurrence in the Boreal, since it inhabits the foothills, in which case it is probably one of the more recently differentiated members of the group. From the few records of its occurrence, it apparently is not found below five thousand or above nine thousand feet.

Colorado. *El Paso Co.* (Brewster, Auk, VIII, 1891, 139); *La Plata Co.* (Morrison, O. & O. XIII, 1888, 115).

New Mexico. *Fort Wingate* (Bendire, Special Bull. No. 1, U. S. Nat. Mus. 1892, 370).

Megascops asio macfarlanei *Brewst.* MACFARLANE'S SCREECH OWL.

The type of this race, now in the Brewster collection, was obtained at Fort Walla Walla, Washington. To this form may be referred all Great Basin specimens of so-called *kennicottii.* It ranges probably from near the eastern foothills of the Cascade Mountains to western Montana, south to about Lat. 43°, and north into southern British Columbia. It has a vertical range of from one to probably seven thousand feet.

Washington. *Fort Walla Walla*, type locality (Brewster, Bull. N. O. C. VII, 27).

Oregon. *John Day River* (Brewster, l. c.); 20 m. S. W. *Camp Harney* (Bendire, Special Bull. No. 1, U. S. Nat. Mus. 1892, 371).

Idaho. *Nez Percé Ind. Res.* (spec. in Hasbrouck coll.).

Montana. *Hellgate* (spec. in U. S. Nat. Mus.).

Megascops asio saturatus *Brewst.* PUGET SOUND SCREECH OWL.

With the exception of Kennicott's Screech Owl this is the extreme northwestern representative of the family in the United States, and is if anything more limited in distribution than *bendirei.* Brewster's type was described from Victoria, British Columbia, and the majority of records are from the same general region. The race is apparently boreal in its affinities, and very

[1] Bendire, Special Bull. No. 1, U. S. N. M., 1892, 370.

little thus far is known concerning it, save that it is known from Salem, Oregon, to the shores and islands of Puget Sound, and from the mainland west of the Cascades.

British Columbia. *Victoria* (type spec. in coll. Wm. Brewster); *New Westminster* (spec. in U. S. Nat. Mus.); *Cadboro Bay* and *Comax* (spec. in coll. Wm. Brewster).

Washington. *Fort Vancouver* (Suckley, 1860, given as *kennicottii*).

Oregon. *Salem* (Brewster, Auk, VIII, 1891, 141).

Megascops flammeolus (*Kaup*). FLAMMULATED SCREECH OWL.

This species, the type of which is deposited in the Dresden Museum, is the most widely distributed of any of the genus inhabiting North America; its range extending over much of the country covered by both the Sierra Nevada and Rocky Mountain ranges, and like *trichopsis* extending far down the Mexican plateau. It has been taken in northern California, southeastern Arizona, in Colorado nearly to the Wyoming line, at Mount Orizaba in Mexico, and as far south as Dueñas, Guatemala. It will thus be seen that the Flammulated Screech Owl is distributed over portions of both the Upper and Lower Sonoran, Transition, (and probably portions of the Boreal), and Tropical faunas, and from the records of capture is apparently not found at a lower altitude than four thousand feet. The United States records are more in number than has been generally supposed — sixteen in all (so far as learned), of which Colorado can lay claim to eleven.

The species has been recorded from the following localities.

California. *San Bernardino Mts.* (spec. in U. S. Nat. Mus.); *Fort Crook* and *Big Trees* (Land Birds Pacific Coast, 1890, 51).

Arizona. *30 miles S. of Camp Apache* (Wheeler Surv. Rep. Orn. Spec. 1874, 135); *Mouth of Little Colorado River* (Merriam, N. Am. Fauna, No. 3, 1890, 91).

Colorado. *Estes Park* (spec. in U. S. Nat. Mus.); *Gold Hill* and *Idaho Springs* (Bendire, Special Bull. No. 1, U. S. Nat. Mus. 1892, 375); *Boulder* (Mrs. Maxwell, Field and Forest, 1877, 210); *Mosca Pass* (Ingersoll, Bull. N. O. C. V, 1879, 121, and Brewster, *ibid.*, VIII, 1883, 123); near *Colorado City* (Brewster, l. c.); *Fremont Co.* (Deane, Bull. N. O. C. IV, 1879, 188); Loveland (Smith, O. & O. 1891, 27—three specimens).

Mexico. *Orizaba Mt.* (spec. in U. S. Nat. Mus.); "*Northern Mexico*" (spec. in Am. Mus. Nat. Hist.); *Valley of Mexico, City of Mexico*, "*Western Mexico*," and "*Mexico*," (Sharpe, Cat. Bds. Brit. Mus. II, 1875, 106).

Guatemala. *Dueñas* (Sharpe, l. c.—two specimens).

Megascops flammeolus idahoensis *Merriam.* DWARF SCREECH OWL.

The type of this subspecies, described by Dr. Merriam from Ketchum, Idaho, remains unique, and is deposited in the collection of the U. S. Department of Agriculture.

Coming now to the southern members of the group, the map may be taken as an illustration of the immense amount of work to be done, and the wide fields for research that present themselves in this portion of the world. Despite the researches of Boucard, Sumichrast and the collectors of Godman and Salvin in Mexico, of Zeledón, Cherrie, Carmiol and Cooper in Costa Rica, Richmond in Nicaragua, Townsend and Wittkügle in Honduras, and Arcé in Veragua, very few specimens of Screech Owls have been secured. So far as distribution goes, it may be well to state that practically nothing is known or is it possible to find sufficient records upon which to base anything like a correct map. Some are known only from the type, others are known from a second, third and fourth specimen secured at type localities, while still others have been taken from such widely separated places, and the records are so few, that it is next to impossible to tell what the true range is. It is of course possible and highly probable that some are extremely local, as is the case with members of the Trochilidæ, but it is to be regretted that we have not sufficient records to substantiate such assumption, and we can but go by those that exist. With the exception of *aspersus* and *vinaceus* (Lower Sonoran) all are Tropical in their affinities, and in this connection nothing further will be said.

It seems peculiar that there should exist so much territory apparently uninhabited by any members of the genus — compare

the map of this region with the foregoing. In the former we had practically the whole country covered by one species or another; here, wide expanses of territory intervene between mapped areas from which no members of the group are known, and even whole political divisions are without a single representative of the genus *Megascops*.

Megascops barbarus (*Scl. & Salv.*)

This species appears to be of restricted range, inasmuch as no records have been found outside of Guatemala. The type was taken at Santa Barbara, Vera Paz, and is now in the Sclater and Salvin collection. The following are the records.

Guatemala. *Santa Barbara, Vera Paz* (Scl. & Salv. P. Z. S. 1868, 56—type); Santa Barbara Mts. (Ibis, 1861, 355); road between *Coban* and *Chicsa* (spec. in U. S. Nat. Mus.); "Central Guatemala" (Ridgway, Proc. U. S. Nat. Mus. 1878, 85–117).

Megascops nudipes (*Vieill.*).

This also is restricted, being confined to Veragua, eastern Costa Rica, and the western portion of what is now Colombia, and eastern and central Costa Rica. Arcé took specimens in both Veragua and Costa Rica; in the latter place it was quite rare in the vicinity of San José, and occurred at only high altitudes.[1]

Costa Rica. *San José* (Cherrie, Auk, IX, 1892, 327); *La Carpintera* and *Cenantes* (spec. in U. S. Nat. Mus.).

Veragua. *Calobre* (Sharpe, Cat. Bds. Brit. Mus. II, 1875, 122).

Megascops cassini (*Ridgw.*).

So far as known the only specimens of this Owl are those in the collection of the National Museum. The type, as described by Mr. Ridgway in 1887, was taken at Mirador, Mexico, and the only remaining records are Vera Cruz and Jalapa (near Vera Cruz), from specimens in the U. S. Nat. Museum. The species appears to be confined to the country immediately surrounding Vera Cruz, and to be one of the more restricted of the group.

[1] Auk, Vol. IX, 1892, 327.

Megascops cooperi (*Ridgw.*).

Like other forms of avian life recently brought to our notice, very little is known as yet of this bird. The type, now in the U. S. National Museum, was described from Santa Ana, Costa Rica, in 1878, and the only other locality from which the species is known is San José (also from a specimen in the National Museum), although Cherrie makes no mention of it in his list.[1]

Megascops brasilianus guatemalæ *Sharpe.*

This is the most widely distributed of the Central American forms, extending from western Guatemala along the mountain ranges to central Veragua, and is the only subspecific member of the genus occurring in Central America. It is but recently (1875) that the subdivision has been made, *Megascops brasilianus* having been hitherto recognized as inhabiting this region; and while typical specimens of *guatemalæ* have been taken in Brazil (Sharpe, Cat. Brit. Mus., 1875, 112), it is generally conceded that *brasilianus* does not come within the boundaries of North America. Specimens have been recorded as follows.

"**Central America**" (Sharpe, Cat. Bds. Brit. Mus. II, 1875, 114).

"**Guatemala**" (Sharpe, l. c.—6 specimens; Am. Mus. Nat. Hist.—1 spec.). *Coban* and *Choctum* (Ridgway, Proc. U. S. Nat. Mus. 1878, 85-117); *Los Salinas* (spec. in U. S. Nat. Mus.).

Costa Rica (Sharpe, l. c.); *San Juan* (spec. in U. S. Nat. Mus.); *San José* (Cherrie, Auk, IX, 1892, 327).

Nicaragua, *Acoyapa* (Sharpe, l. c.).

Veragua (Sharpe, l. c.—5 specimens); *Chitra* and *Chiriqui* (Ridgway, Proc. U. S. Nat. Mus. 1878, 85-117).

Megascops hastatus *Ridgw.*

The type of this species was described from Mazatlan, Sinaloa, Mexico, in 1887, and is deposited in the U. S. National Museum. At the present writing but one other specimen is known, also from Mazatlan. In cases of this kind it is of course impossible to give other than an assumed range, and of very limited extent.

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[1] Auk, Vol. IX, 1892, 322-329.

M. hastatus probably extends from the type locality back into the mountains for a considerable distance in every direction.

Megascops vermiculatus *Ridgw.*

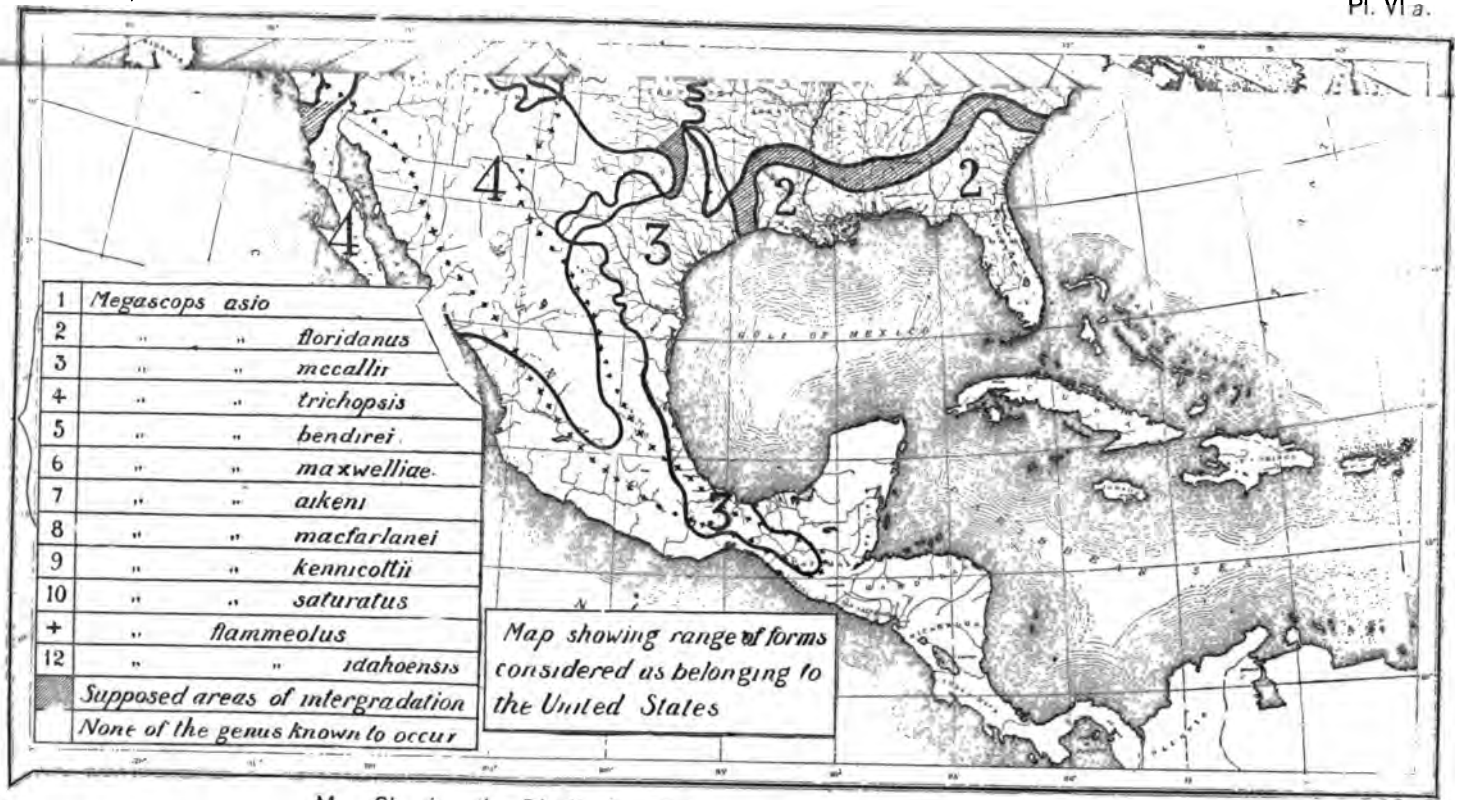
Costa Rica has been said to be by far the most productive of bird life of all the Central American Republics,—a statement that does not appear overdrawn on considering a fourth species of Screech Owl in addition to the three already mentioned from that country. *Megascops vermiculatus* was described from San José in 1887, the type and one other specimen, bearing simply "Costa Rica" on the labels, being now in the U. S. National Museum. Cherrie makes no mention of it in his list (Auk, IX, 327), and the species must be either exceedingly rare or overlooked in his paper. The range has been given as central Costa Rica in the vicinity of San José.

Megascops aspersus *Brewst.* SPOTTED SCREECH OWL.

The only known specimen of this bird is in the collection of William Brewster, who described the species in 1887 from El Carmen, Chihuahua, Mexico.

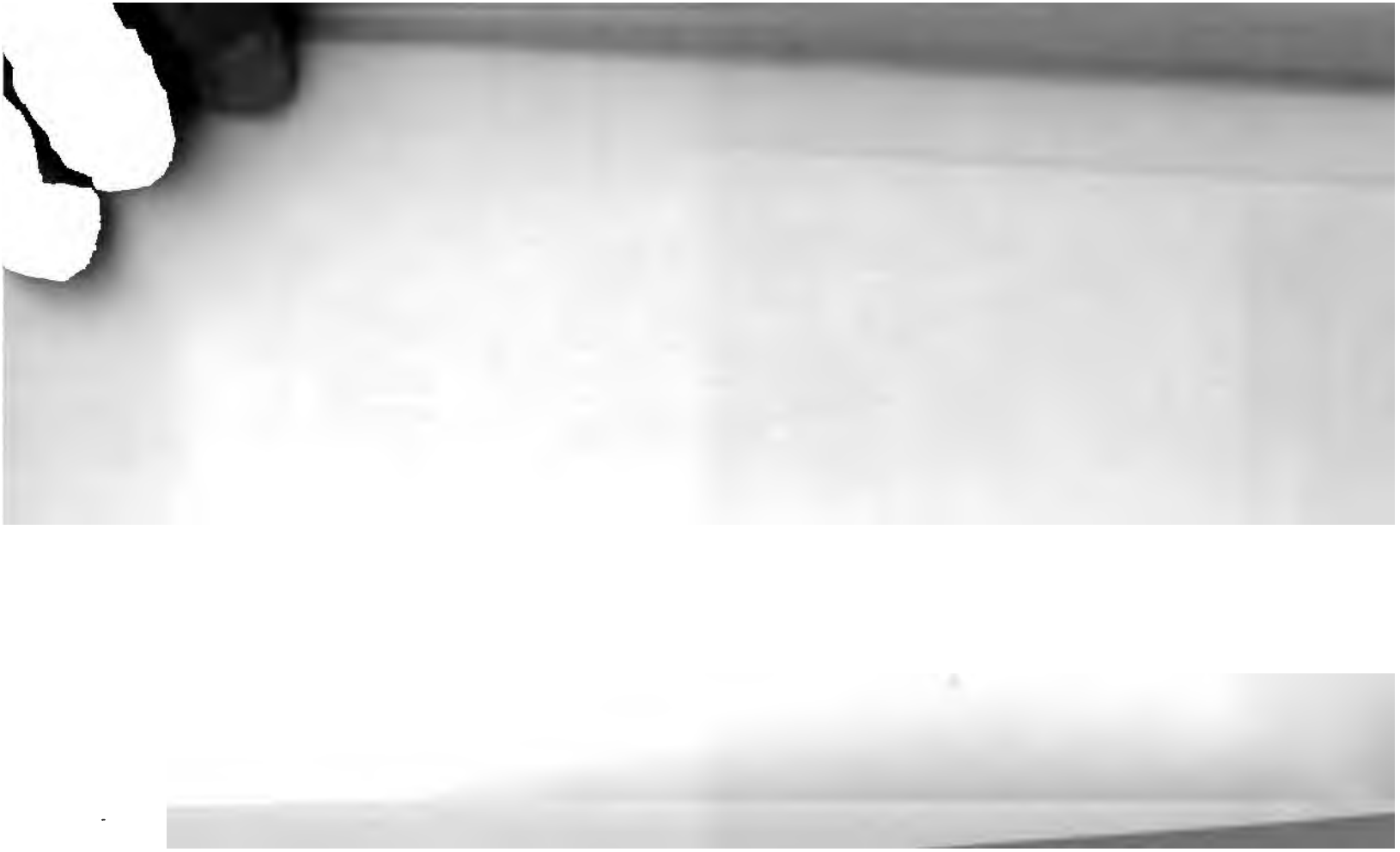
Megascops vinaceus *Brewst.* CHIHUAHUA SCREECH OWL.

Like the preceding species, nothing further is known of the Chihuahua Screech Owl beyond the type specimen taken at Durasno, Chihuahua, Mexico, and described in 1888.



Map Showing the Distribution of the North American Forms of *Megascops*.

Map showing the Distribution of the Central American Forms of *Megascops*.



BIRD NOTES FROM LONG ISLAND.

BY WILLIAM DUTCHER.

"Betwixt th' extremes, two happier climates hold
The temper that partakes of hot and cold."

DRYDEN.

IF the English poet had had Long Island in his mind when he wrote these lines he could not have more happily described its climatic conditions. Situated midway between tropical Florida and arctic Labrador, it draws from each wanderers who find there conditions sufficiently congenial to attract them beyond the border of their habitats. The following records will show, with force, how extremes may meet and make new records or substantiate old or vague ones.

Urinator arcticus. BLACK-THROATED LOON.—This is the first positive record of this species on Long Island, and also in New York State, and is probably one of the very few specimens that have been taken in the United States. Mr. J. P. Giraud, Jr., does not give it in his 'Birds of Long Island,' published in 1844, although Mr. George N. Lawrence includes it in his list published in 1866, notwithstanding there is not a specimen in his collection, now in the American Museum of Natural History in New York City. In Volume X of the 'Pacific Railroad Reports,' published in 1858, Mr. Lawrence, who wrote the history of a portion of the water birds, says, "I have never been so fortunate as to meet with an American specimen of this bird." In the 'North American Birds,' by Baird, Brewer, and Ridgway it is considered "very rare, and not even positively known to occur in the United States." (Water Birds, Vol. II, p. 453.) The only United States record of which I know is of one shot in Sandusky Bay in 1880 (vide Wheaton's 'Birds of Ohio,' p. 565). It is with great pleasure, therefore, that I am able, through the kindness of M. J. Earley, Esq., of this city, to record the capture of a full-plumaged adult male. I append his letter.

New York, May 16, 1893.

Dear Sir:

The bird which I sent to Mr. Wallace, taxidermist, to be mounted, and which you inform me is a Black-throated Diver, was killed by Gus Merritt, of City Island, on Saturday morning, April 29, between Sands Point lighthouse and Execution lighthouse. He was one of a party of young men who left City Island in the middle of the night to lie in line for Ducks between Sands Point lighthouse and Execution lighthouse. At daylight on Saturday morning the bird flew from the east,

and was killed by him as it passed over his boat. I received it from Mr. Merritt a few days afterwards and sent it to Mr. Wallace where you saw it.

Yours, very truly,

M. J. EARLEY.

The specimen while yet in the flesh was brought to the attention of Mr. L. S. Foster by Mr. Wallace, who, after he had skinned it, gave me the body for sexing. I found the sexual organs very fully developed and the bird very fat. Most of the skeleton has been preserved, and is now in the osteological collection of the American Museum of Natural History.

Branta nigricans. BLACK BRANT.—The following letter from Mr. George N. Lawrence, dated September 9, 1889, is of great interest: "I send an account of a Black Brant I saw lately at Babylon. I think this is the second specimen obtained on Long Island, the other being in the Museum of the Long Island Historical Society. In the office of the Watson House I saw a fine specimen which was killed this spring in the Great South Bay. On inquiry I found it was shot by William Saxton, a noted gunner and bayman. I went to see him to get any facts concerning its acquisition that he was able to give. He said Brant were unusually plenty in the spring, and one day while lying at his decoys he saw a flock of about thirty individuals approaching, and as they were passing at a long range he fired and knocked out five. On picking them up he noticed one very black in color and of rather larger size than the others; he at once concluded it was a Black Brant, of which he had often heard his father speak, though he had never seen one. He sold it with other birds to a dealer, from whom it was purchased by Mr. Stetson."

Tantalus loculator. WOOD IBIS.—This species is new to Long Island, not having been included in any previous list. This specimen was brought to my attention by Mr. John C. Knoess, taxidermist, of Riverhead, who mounted it and published a note of its capture in the 'Republican Watchman' of Greenport, Suffolk Co., under date of August 16, 1890. Subsequently Mr. C. A. Schellinger, who owns the specimen, wrote me that he shot the bird June 21, 1890, in a swamp north of East Marion; it was alone and is the only one of the kind ever seen there.

Nycticorax violaceus. YELLOW-CROWNED NIGHT HERON.—Mr. Giraud dismisses this southern Heron with few words, merely saying, "The Yellow-crowned Heron seldom extends its visits to Long Island."[1] His statement, written in 1844, would apply today just as well, for it is only now that I am able to make my first record of this species during a period of fifteen years' collecting. Mr. A. D. Lott, one of my valued correspondents, wrote to me that a specimen of *N. violaceus* had been caught alive, in the latter part of April, in a swamp near the village of Freeport, Queens Co. He adds, "We have never seen a bird like it before."

[1] 'Birds of Long Island,' p. 281.

NOTES ON SOME RARE BIRDS IN THE COLLECTION OF THE LONG ISLAND HISTORICAL SOCIETY.

BY WILLIAM DUTCHER.

THE Long Island Historical Society was organized at a meeting held March 3, 1863, in the rooms of the Hamilton Literary Association, by a few persons interested in local history and kindred subjects, and in the following month it was formally incorporated under its present name. Rooms were then obtained in a building located at the corner of Court and Joralomen Streets, Brooklyn, owned by the late Mr. A. A. Low. Such material as was added to the collection from time to time was exhibited there until the summer of 1880, when the Society moved to its present commodious and fire-proof building at the corner of Pierrepont and Clinton Streets. Shortly after the organization of the Society a department of natural history was instituted, and has been a valuable adjunct to the more general purposes of the institution. A small and unostentatious beginning has become the nucleus of an excellent and instructive collection of the zoölogy of Long Island, and has grown to embrace much of value of its ethnology, local antiquities, and historical relics. The work of the Society is defined in Article II of its by-laws as follows: "The object of the Society is to discover, procure, and preserve whatever may relate to general history, especially the natural, civil, literary, and ecclesiastical history of the United States, the State of New York, and *more particularly* of the counties, towns, and villages of Long Island." Later a committee consisting of Mr. Elias Lewis, Jr., Mr. J. Carson Brevoort, Mr. Henry E. Pierrepont, Prof. Chas. E. West, and Mr. Charles Congdon, was formed, whose special duties were defined as follows: "To collect, procure, and preserve whatever might illustrate the natural history of Long Island." This latter department now contains three hundred and twenty-nine well-mounted specimens and three hundred and eleven unmounted skins of Long Island birds, representing some two hundred and ninety-six species. Its collection of eggs

contains about one thousand specimens, representing one hundred and fifty-three species. The larger part of the collection represents the avifauna of Long Island although a few extra-limital species are included. The great educational and historical value of this well-housed collection shows very forcibly the good results that can be obtained by the unselfish and determined efforts of public-spirited citizens, who give not only of their time, but of their means, to build an institution that adds largely to the intellectual growth, the patriotism, and love of good citizenship of the neighborhood. The greater the number of such institutions that we have formed throughout our land the greater the benefits that we of the present generation shall bestow on those who may take up our unfinished work.

All of the specimens in the bird collection were presented to the Society by a few donors, the larger part coming from Col. Nicolas Pike, long a resident of Kings County, and always an ardent and successful sportsman, and withal an accurate and scientific field naturalist. Early in the thirties he commenced to make a collection of the birds of Long Island, which he continued for many years and finally presented to the Historical Society. In the annotations of the species, which will follow, many very interesting items of Long Island bird history will be given from his note-books.

Coincident with the early work of Col. Pike, Mr. John Akhurst established himself as a taxidermist in Brooklyn where he has followed his profession for over half a century. Nearly all the specimens in this collection were mounted by Mr. Akhurst, who beside his skill in taxidermy is also an excellent field naturalist. During a recent visit to him, Mr. Akhurst, while in a reminiscent mood, related to me many interesting incidents relative to the early history of this collection. He said for many years Col. Pike and himself collected birds and other zoölogical specimens in Kings County which was then largely wooded or occupied as farmland where now it is covered with streets and blocks of dwellings. Fulton Market in New York City was, as it is now, the depot for the sale of produce from Long Island, and the dealers there received from the professional gunners on Long Island a large number of game birds and many rare birds. There was a great rivalry between Mr. Akhurst and

the late John G. Bell of New York as to who would get the rarities, and many an early morning visit was made to the market by each in hopes that he would be the first to find and secure some new and strange specimen. Another channel through which many birds came to Mr. Akhurst was by a travelling marketman known as 'Old Jake' who twice per week travelled with a horse and wagon from Babylon to Brooklyn, a distance of forty miles, and brought to the city, for sale, game, poultry, eggs, and other country produce. Knowing that he could always find a market for rare or uncommon birds with Mr. Akhurst, he brought to him all he secured during his semi-weekly trips along the South Shore. Local gunners, of whom there were many in Brooklyn, brought to Mr. Akhurst rarities for identification, sale, or mounting. While it is difficult at this late date to establish full data for each specimen in the collection, yet, from the notebooks of Col. Pike and Mr. Akhurst's knowledge of the specimens, can be established the fact that all those annotated hereafter are from Long Island, and in many cases the exact locality and date of capture can be given. A few specimens have been contributed by other individuals whose names will appear in connection with the species. In this connection it is but just to state that the addition of a branch of natural history to the objects of the Historical Society originated entirely with Mr. Elias Lewis, Jr., and it is due to his untiring and devoted labor that this collection has attained its present size. Since its foundation he has been the honorary curator of the collection, and it is due to his care that it has been preserved in its present excellent condition. There are many gaps yet to be filled in the collection before it will be a complete representation of the avifauna of Long Island. These gaps can be filled with little difficulty, provided the necessary means are furnished the curator. It is to be hoped that civic pride will lead some individual in Brooklyn to complete the work that has been so admirably commenced by Mr. Lewis. The arrangement and nomenclature of the collection follows Mr. George N. Lawrence's list, published in 1866, but it will be re-arranged and re-labelled according to the order and nomenclature of the American Ornithologists' Union Check-List (1886 ed.) by the writer before the close of the present year. In the following annotations no mention of the commoner species will be made,

only of those that can be considered rare, or otherwise important or interesting.

Sula sula. BOOBY.—This specimen is in immature plumage and was mounted by Mr. Akhurst from a bird in the flesh. It is labelled: "Shot on Moriches Bay," and was presented by Mr. H. G. Reeve.

Pelecanus erythrorhynchos. AMERICAN WHITE PELICAN.—This specimen bears on its label the words "Canarsie Bay, presented by J. C. Brevoort." It was mounted by Mr. Akhurst who purchased the bird in the flesh with funds provided by Mr. Brevoort. No date is given.

Anas strepera. GADWALL.—Presented by Col. Pike, who says: "Killed in a fresh water pond near Speonk, Long Island, 1841. Formerly common."

Aythya collaris. RING-NECKED DUCK.—There are two specimens, male, in full breeding plumage, labelled "From south side of Long Island." Mr. Akhurst mounted both, and states that they were purchased in Fulton Market, New York City, of Messrs. A. & E. Robbins who said they came from the south side of Long Island. No date is given.

Glaucionetta islandica. BARROW'S GOLDEN-EYE.—This specimen was presented by Mr. Akhurst who states that it was purchased in the flesh from 'Old Jake,' who procured it from one of the gunners on the south side of Long Island. There is no date attached to the specimen, nor any locality except as above stated. This is the only specimen of this species ever procured by Mr. Akhurst.

Histrionicus histrionicus. HARLEQUIN DUCK.—One specimen in the collection, recorded in Auk, Vol. VI, p. 67, by George B. Badger.

Camptolaimus labradorius. LABRADOR DUCK.—The writer has already recorded full data regarding the specimen of the Labrador Duck in this collection. In this connection some statements by Mr. Akhurst relative to the former abundance of this now extinct Duck are of interest. During the period between 1843 and 1850 he made up a number of specimens and shipped them to England and Germany. A near neighbor of his was captain of a packet ship running between New York and England, and carried many specimens of American water fowl to collectors in England, among them at least twenty Labrador Ducks. Mr. Akhurst has no means of knowing to whom these birds were sent as they were purchased by the captain on orders. He filled a similar number of orders for Labrador Ducks for collectors in Germany, which were sent by a captain sailing from New York to some of the German ports. It is fair to assume even at this late day that some of these specimens must still be extant in Europe, presumably in private collections.

Chen cærulescens. BLUE GOOSE.—This specimen was presented by Col. Pike who killed it on Shinnecock Bay opposite Ponquogue, while in a blind at a place known as the 'Hole-in-the-Wall.' "There were two individuals; one I killed, and the other fell at some distance from me and I did not search for it. I consider it a very rare bird on Long Island."

Anser albifrons gambeli. AMERICAN WHITE-FRONTED GOOSE.—There are two specimens in the collection, one labelled "Presented by H. G. Reeve, shot on Montauk," and the other "Presented by Col. Nicolas Pike." Col. Pike says of this species: "It is very rare, and I consider it the finest game bird I have ever eaten, much superior to the Canvas-back Duck or a young Canada Goose. I have met with it but three times in my life. The first one I killed from a blind in Great South Bay in November, 1846. This is the specimen in the collection. I find in my notes that a second one was killed from a battery off Islip in 1849, March 18th. What became of this bird I do not know, unless I let Philip Brasher have it. The third and last specimen was killed by me from a shore blind where I was lying for Ducks. This was March 2, 1872. It was badly mutilated, for I killed it when close to me. It was picked and eaten and pronounced a delicious morsel."

Branta nigricans. BLACK BRANT.—There is an exceptionally fine specimen of this species in the collection, which was shot by Col. Pike in Great South Bay, off Islip, Long Island, in 1840. He tells me: "I had the skin some years before Mr. Lawrence described the Black Brant as a new species.[1] The late Professor Baird saw it while on a visit to my house and remarked that it was an interesting specimen; this was in 1844 when I resided in Henry Street, Brooklyn. Some years after, but subsequent to the date Mr. Lawrence separated the Black Brant, he saw my specimen and gave me its correct name. Prior to that time I had considered it only an exceptional Brant."

Plegadis autumnalis. GLOSSY IBIS.—Col. Pike presented this specimen, and states as follows: "I have killed this species twice on Long Island, one at Southampton on September 12, 1847, and one at Canarsie Bay on October 10, 1848. Mr. Akhurst purchased still another specimen in Fulton Market that was shot on Long Island. It was purchased by Col. Pike who presented it to Count Tipani, who took it to Italy."

Ardea cœrulea. LITTLE BLUE HERON.—Both are in the dark phase of plumage and are labelled "South Bay." Col. Pike's notes are as follows: "These birds were killed by me on the meadows of the Great South Bay on August 17, 1847. They were at that time frequently met with. In 1888 I passed three weeks shooting at Ponquogue, Long Island, and was surprised not to meet with them."

Rallus crepitans. CLAPPER RAIL.—There is a fine specimen of this common Long Island bird in albinistic plumage. There are no data with it.

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[1] 1846. Lawrence, George N. — Description of a new species of *Anser*. By George N. Lawrence. Read March 16, 1846. Ann. Lyc. Nat. Hist. New York, Vol. IV, 1847, pp. 171, 172, plate xii, of *Anser nigricans*. Issued in Nos. 6, 7, August, 1846. 1. Anser nigricans, n. s., Egg Harbor, N. J., pages 171, 172.

Porzana noveboracensis. YELLOW RAIL.—Two specimens which Col. Pike killed on the meadows near Southampton, Long Island, in 1848. He says of the species: "Formerly often met with, now very scarce. Ten years ago while shooting over the same ground I did not meet with a single individual."

Ionornis martinica. PURPLE GALLINULE.—"Formerly very plentiful; slowly passing away. I have not seen one of these birds for many years on Long Island. The specimen in the Long Island Historical Society's collection was shot by me at Indian Pond,[1] Long Island." — (*Nicolas Pike*, MS. notes.)

Recurvirostra americana. AMERICAN AVOCET. — Says Col. Pike: "I have met with this bird but four times in my life, and it has always been extremely rare on Long Island. The first individual I procured near Ponquogue in 1844, and is the specimen in the collection. The second was killed in 1847 on the shore of Canarsie Bay, near where now stands the Oriental Hotel, Coney Island; I had a shooting box there. The others were killed at Southampton."

Himantopus mexicanus. BLACK-NECKED STILT —Two specimens are in the collection, one labelled "Great South Bay, 1843," and the other "Great South Bay." Col. Pike says of them: "These birds were collected by me and the location is correct. Always a rare bird on Long Island; I have not seen one in my rambles for over thirty years."

Numenius longirostris. LONG-BILLED CURLEW.—Two specimens are in the collection, labelled "Rockaway Meadows." Of this species Col. Pike says: "I have shot hundreds of these birds, and fifty years ago they were very plentiful. On 'Foster's Meadows' I always met with them. In the last twenty-five years they seem to have disappeared, and I have not met a single individual. The location of the two specimens in the collection is all right."

Hæmatopus palliatus. AMERICAN OYSTER-CATCHER.—This specimen was brought to Mr. Akhurst in the flesh by 'Old Jake,' the peddler referred to before. It is labelled "South Side Meadows," and was probably shot on the Great South Beach somewhere between Fire Island Inlet and Coney Island. There is no date attached, although Mr. Akhurst says it was many years since and is the only one he ever had from Long Island. Sex not given.

[**Tympanuchus cupido.** HEATH HEN.—There is no specimen of this species in the collection. Col. Pike remembers having killed individuals of this species a number of times on Long Island — the first time in 1836. "I was making a tour on foot round the Island, collecting, and one morning while encamped at 'Comac Hills' we found our larder empty and visited the plains for game. We killed a number of these birds and made some skins of them. They were not plentiful, yet we procured all we wanted. Soon after a law was enacted for their preservation. I have not

[1] Indian Pond is at Flatlands, near the old race course. It is in the woods some distance from the Coney Island road.

met with an individual for twenty-five years in the woods or plains which I have hunted over, and I am afraid they are nearly extinct." The Heath Hen has undoubtedly been extinct on Long Island for at least half a century, and it is important, therefore, to place on record all of its life history that can now be obtained from living witnesses. Our esteemed fellow-member Mr. George N. Lawrence is one of the few living scientists who have had the privilege of seeing this species on its native heath. It is with much pleasure, therefore, that I append herewith a letter from Mr. Lawrence relative to bygone days and that extinct bird.

"*My Dear Mr. Dutcher:*

"Did you ever endeavor to trace the specimen of Pinnated Grouse which I informed you I saw at Hempstead about sixty years ago, mounted and under a glass shade? It was said to be the last example of its race on Long Island, formerly so numerous, and known to the natives as the Heath Hen.

"I think it was in the summer of 1831 that I accepted the invitation of a friend to spend a few days with him at the residence of his grandmother at Mastic for the purpose of shooting Bay Snipe in the Great South Bay. At that time the only mode of conveyance was by stage coach. We started from Brooklyn in the morning (another friend going with us), and by noon we reached Hempstead where, at the roadside tavern, while waiting in the parlor for dinner, I was interested in the specimen above alluded to; it was a fine specimen and in good condition; possibly it may be still in the possession of some member of the family.[1] At night we stopped at Patchogue and did not reach our destination until the next morning.

"The Grouse at one time were quite abundant in the scrub oaks of the middle part of the island. I remember hearing of the successful shooting of them by Mr. John Norton. One day he got in the midst of a covey, which was scattered around him in a piece of scrub oak. On shooting one, instead of securing it, he threw down some part of his wardrobe to mark the spot, first his hat, then his cravat, coat and vest; — how far he disrobed I am unable to tell, I suppose that depended upon the number of birds killed. I remember Mr. Norton very well, he was a small man and an enthusiastic sportsman. The family mansion where he resided was on comparatively high ground, just west of Far Rockaway, and bordering on the ocean. The old house was removed by the march of improvement, and the grounds in which it stood are now known by the euphonious name of Wave Crest.

"As is known by ornithologists, the Long Island bird was considered to be identical with the Prairie Hen of the West, but quite recently it has been decided by Mr. William Brewster that they are distinct species. It

[1] A visit to Hempstead to see this specimen revealed the fact that it was destroyed by fire a few years since. — W. D.

is surprising that this was not discovered sooner, as their habitats were so very different, one frequenting a dense scrub oak region and the other an open prairie country.

Yours truly,

January 20th, 1892. GEO. N. LAWRENCE."]

Ectopistes migratorius. PASSENGER PIGEON.—There is but one specimen in the collection; it is without data. Col. Pike contributes the following interesting note regarding the former abundance of this species and an old time recollection of shooting them within the present city limits of Brooklyn. "Near Second Place (now blocks of brown stone dwellings) there used to be a large, thickly-wooded hill; at that time (1840) this was out of town, and there were very few houses between the City Hall and it. Sportsmen used to gather at this place to shoot Wild Pigeons. In crossing Long Island the Pigeons used to take this wooded hill in their flight, to rest before they crossed at the Narrows below. I have seen thousands there, and have killed a great many at that place. They have been gradually growing less since, and for the last fifteen years I have not seen a single individual on Long Island. Just fifteen years ago I was collecting at Flatlands and I shot one, the last I ever met; I am sorry I killed it. They are gradually becoming extinct everywhere, and in a few years they will be entirely wiped out."

Accipiter atricapillus. AMERICAN GOSHAWK.—The collection contains two fine specimens, both of which were mounted by Mr. Akhurst. One is in immature plumage, and was presented by Mr. James A. Hewlett of Rockaway, Queens Co. No date is given. The second specimen is an adult bird, and was shot by Mr. W. Day at Bay Ridge, Kings Co. This person was a retail dealer in poultry and kept a stand in Bond Street, Brooklyn; he was very fond of a gun, and shot during the season many small birds, as Robins, Golden-winged Woodpeckers, etc., which he sold. When he shot such birds as Owls, Hawks, etc., he took them to Mr. Akhurst, who bought them to mount. There is no date given with this specimen, although Mr. Akhurst thinks it was probably shot early in the sixties. He recalls one winter about thirty years since when there was a remarkable flight of Goshawks on the Island. They were nearly all adult birds, and were so plentiful that he refused to buy them even at twenty-five cents each. He shot a number, and purchased many more, all of which he preserved and afterwards sold. He has never seen such a flight since although he has occasionally received specimens.

Aquila chrysaëtos. GOLDEN EAGLE.—This specimen was brought to Mr. Akhurst alive by a negro who caught the bird at Canarsie. To prevent its escape it was wrapped in a piece of old fish-net. The price paid for the bird was $5.00, which sum was furnished by the late Mr. Van Brunt Wyckoff of Bay Ridge. No date or sex is given.

"**Hierofalco Islandicus** (*Sabine*). JER. FALCON."—Recorded by Mr. George N. Lawrence[1] in his list, in the following words: "This species is

[1] Ann. Lyc. Nat. Hist., Vol. VIII, 1866, p. 280.

of rare occurence in our vicinity. A beautiful specimen, not quite adult, was most liberally presented to me by our fellow member Mr. John Akhurst, taxidermist, of Brooklyn; it was killed on Long Island in the winter of 1856." Subsequently Mr. Lawrence informed me that the specimen in the Long Island Historical collection had been presented by him and was the one referred to above.

Strix pratincola. AMERICAN BARN OWL.—This specimen came from Bay Ridge, Kings Co., and was purchased by Mr. Akhurst from some of the local gunners in that neighborhood. This and the following specimen were procured many years since when all that tract of country about Bay Ridge was farm or forest land, and was not occupied by dwellings as it is now.

Surnia ulula caparoch. AMERICAN HAWK OWL.—This is a fine specimen of this very rare Owl, and was also secured from some of the local gunners at Bay Ridge. It was brought in the flesh to Mr. Akhurst who purchased and mounted it. He thinks it all of thirty years since the bird was secured. It is the only one that ever came to his notice or possession from Long Island.

Ceophlœus pileatus. PILEATED WOODPECKER.—There are two specimens of this large Woodpecker in the collection, both of which were mounted from birds brought to Mr. Akhurst in the flesh. One was presented by Mr. H. G. Reeve, and the other belonged at one time to the late Mr. Philip M. Brasher. Further than that they are Long Island birds, Mr. Akhurst can give no information. He states that before the outskirts of Brooklyn were built upon, there was a large tract of forest running eastward from the Flatbush road. While there were many places in it that were denuded of trees and overgrown with under-scrub and second-growth, yet as a whole the timber was large and of the original growth. It was a very fine collecting ground, being situated at the extreme western end of the Island, and a large majority of the birds migrating over Long Island naturally sought this tract for resting and feeding. For years, in the spring and fall, Mr. Akhurst visited this place almost daily, either alone or in company with Col. Pike, and many of the rarest specimens now in the Long Island Historical collection were obtained on these excursions. During one of them Mr. Akhurst saw two Pileated Woodpeckers, but they were so extremely wild that he did not secure either of them. Being perfectly familiar with the species, he is satisfied that he was not mistaken in the identification. These four specimens are all that have ever come to his notice.[1]

Melanerpes carolinus. RED-BELLIED WOODPECKER.—This specimen was presented by the late Dr. H. F. Aten, of Brooklyn; there are no data connected with it. Mr. Akhurst states that during the period he was actively collecting in the tract of timber referred to above, he saw several specimens of *M. carolinus*, but for a great many years he has not found

[1] See Bull. Nuttall Ornith. Club, Vol. VI, p. 126.

any. The absence of the species probably arises from the fact that the character of the country has been entirely changed by the cutting down of the forests and the occupation of the land by dwellings and streets.

Contopus borealis. OLIVE-SIDED FLYCATCHER.—There is but one specimen of this species in the collection; it was presented by Mr. John D. Hicks, who procured it a number of years since near his home in Old Westbury, Queens Co. He informs me that it is the only one he recollects ever having seen.

Corvus corax sinuatus. AMERICAN RAVEN.—One specimen in the collection. Col. Pike says: "I never met with this bird. While shooting in 1836 at 'Comac Hill' my companion, Mr. George Bartlett, killed a fine specimen and I skinned it; it is the one in the collection. Philip Brasher had one in his collection that was killed in the woods near Prospect Park.[1] This was in 1848. These are the only specimens I have ever known to be killed on Long Island."

Loxia leucoptera. WHITE-WINGED CROSSBILL.—"The White-winged Crossbills in the collection were killed by me in Lotts Woods, Flatlands, in 1848. This year there seemed to be quite a flight of these birds, as many were killed. I have seen them but once since, in 1864, when I killed two near 'Cypress Hill Cemetery.'"—(*Nicolas Pike*, MS. notes.)

Guiraca cærulea. BLUE GROSBEAK.—This wanderer from the south was taken in May, 1843, at Canarsie. It is a very fine, adult, male specimen. Mr. Akhurst recollects having shot during his active collecting some three or four specimens of this exotic bird, and having seen a few others that he did not secure. However, it is a great many years since he has seen one.

Spiza americana. DICKCISSEL.—The specimen in the collection was taken by Col. Pike at College Point, Long Island, in 1841. Mr. Akhurst states that about that period they were very common birds, breeding freely all over Kings County, in suitable localities, especially in clover fields. He has not seen any for many years.

Protonotaria citrea. PROTHONOTARY WARBLER.—In April, 1888, I recorded a specimen of this Warbler which was sent to me for identification by the keeper of Montauk Light, and which I supposed was the first one that had been taken in New York State. I find, however, that as early as May, 1849, one was shot at Jamaica, Queens Co. It was a male in full breeding plumage, and was mounted by Mr. Akhurst. It is the only one he ever saw from Long Island.

Helmitherus vermivorus. WORM-EATING WARBLER.—Two specimens are in the collection, one presented by Mr. C. H. Baxter who secured it at Newtown, Long Island, and the other by Col. Pike who shot it in the Valley Grove Woods, now part of Prospect Park, Brooklyn. Mr. Akhurst states that during his active collecting he secured several of

[1] This specimen is now in the collection of the University of Vermont, Burlington, Vt., this institution having purchased the Brasher collection.

these Warblers from Kings and Queens Counties. Col. Pike states that he has not seen this bird for many years and always considered it rare on Long Island.

Helminthophila ruficapilla. NASHVILLE WARBLER.—The specimen in the collection was shot by Col. Pike in what is now Prospect Park, Brooklyn, and was mounted by Mr. Akhurst who also procured one or two specimens. Col. Pike considers them rare on Long Island.

Helminthophila celata. ORANGE-CROWNED WARBLER.—This specimen was shot on the East-side lands by Mr. Akhurst, and is the only one he ever procured. It is in immature plumage, and was shown to, and identified by, Mr. George N. Lawrence.

Dendroica cærulea. CERULEAN WARBLER.—There is a fine male specimen of this species in full breeding plumage, which Mr. Akhurst shot in the vicinity of Crow Hill, where the Kings County Penitentiary now stands. There is no date attached to the specimen, nor can Mr. Akhurst recollect when it was secured; it is the only one he ever obtained on Long Island.

Dendroica dominica. YELLOW-THROATED WARBLER.—This very rare specimen is a male, and was shot by Mr. Akhurst in the same locality in which he secured the Cerulean Warbler. It is the only one he ever saw on Long Island.

Geothlypis formosa. KENTUCKY WARBLER.—This specimen was shot by Col. Pike in Lotts Woods, Flatlands, in May. He considers them rare on Long Island, and has not seen a specimen for some years.

Sylvania mitrata. HOODED WARBLER.—There are two specimens of this species, both presented by Mr. Chas. H. Baxter after they had been mounted by Mr. Akhurst. Neither of them has any locality or date attached. Mr. Akhurst states positively that they were from birds brought to him in the flesh.

Parus bicolor. TUFTED TITMOUSE.—This specimen was also procured by Mr. Akhurst in the second growth on the East-side lands within the city limits of Brooklyn; he states that during his active collecting he saw a number of these birds. It is such a noisy species that any individuals in a locality are sure to attract the collector by their outcry.

Polioptila cærulea. BLUE-GRAY GNATCATCHER.—There is but one specimen in the collection, labelled "Shot by J. Akhurst, at Canarsie, in 1849." It is the only specimen that Mr. Akhurst recollects ever having seen from Long Island.

Saxicola œnanthe. WHEATEAR.—The Historical Society possesses but one specimen of this boreal bird. It is one of the latest additions to the collection, having been shot at Jamaica, Queens Co., in 1885 by Mr. John Pringle, a nurseryman of Brooklyn, and taken to Mr. Akhurst who mounted it. Mr Pringle stated that he saw two of these birds in company, but secured only the one presented to the Historical Society.

NOTES ON TWO COSTA RICAN BIRDS.

BY GEORGE K. CHERRIE.

Ramphocœlus costaricensis.

I recently published some notes on this species,[1] which I may be pardoned for repeating in this place with a few additions, as the original description of the species was published in 'The Auk' (Vol. VIII, 1891, p. 62). At that time I believed the male and female to be alike in plumage, the six specimens I then had —three males and three females— being exactly alike. However, during a recent exploring trip along the southwest coast region of Costa Rica, I was fortunate in securing a large series of specimens of this bird of both sexes and all ages. This species clearly demonstrates that the adult male *costaricensis* is distinguishable from the adult male *passerinii* only by its slightly larger size and the different wing formula. Females and young males are at a glance distinguishable from female and young *passerinii* by the bright ochraceous rufous breast and rump.

During my stay at Boruca and Palmar (the last of February) the breeding season was at its height, and I observed many of the Costa Rica Red-rumps nesting. In almost every instance where possible I collected both parents of the nests, and in the majority of cases found the males wearing the same dress as the females! In a few instances the male was in mottled plumage, evidently just assuming the adult phase, and in a lesser number of examples the male was in fully adult plumage— velvety black and crimson red.

From the above it is clear that the males begin to breed before they attain fully adult plumage, and that they retain the dress of the female until, at least, the beginning of the second year.

While on this trip I had many proofs that—in spite of its rich plumage, and being a bird of the tropics—*R. costaricensis* is well worthy to hold a place of honor among the song birds. And if the bird chooses an early hour and a secluded spot for

[1] Anales del Instituto Físico-geográfico y del Museo Nacional de Costa Rica, III, 1890, p. 135.

expressing its happiness, the melody is none the less delightful. At the little village of Buenos Aires, on the Rio Grande of Terraba, I heard the song more frequently than at any other point. Close by the ranch house at which we were staying, there is a small stream bordered by low woods and underbrush, that formed a favorite resort for the birds. Just below the ranch is a convenient spot where we took our morning bath. I was always there just as day was breaking. On the opposite bank was a small open space in the brush occupied by the limbs of a dead tree. On one of these branches, and always the same one, was the spot chosen by a Red-rump to pour forth his morning song. Some mornings I found him busy with his music when I arrived, and again he would be a few minutes behind me. Sometimes he would come from one direction, sometimes from another, but he always alighted at the same spot and then lost no time in commencing his song. While singing, the body was swayed to and fro, much after the manner of a Canary while singing. The song would last for perhaps half an hour, and then away the singer would go. I have not enough musical ability to describe the song, but will say that often I remained standing quietly for a long time, only that I might listen to the music.

Thamnophilus bridgesi *Scl.*

Thamnophilus bridgesi SCL. P. Z. S. 1856, p. 141; Cat. Bds. Brit. Mus. XV, p. 194; SALV. P. Z. S. 1867, p. 144; 1870, p. 194; LAWR. Ann. Lyc. N. Y. IX, p. 107; ZELEDON, An. Mus. Nac. Costa Rica, 1887, p. 114; SALV. & GOD. Biologia, II, p. 199.

Thamnophilus punctatus CAB. J. f. Orn. 1861, p. 241; SALV. Ibis, 1870, p. 110; P. Z. S. 1870, p. 194; ZELEDON, An. Mus. Nac. Costa Rica, 1887, p. 114; SCL. Cat. Birds Brit. Mus. XV, p. 191; SALV. & GOD. Biologia, II, p. 198.

I have before me a series of sixty-eight specimens, thirty-eight males and thirty females. The males might be referred to *T. punctata* and the females to *T. bridgesi*, according to the original descriptions. But in four years' collecting at various points through the country I have never met with a male '*bridgesi*' nor a female '*punctata*.' I have always found the two associated together, and, in my last trip to the southwest coast, mated and

nesting. Consequently I conclude there has been some error, and that *T. punctata* should become a synonym of *Thamnophilus bridgesi*, *bridgesi* being the older name.

In Costa Rica *T. bridgesi* seems to be confined to the Pacific side of the country, and is not an uncommon bird from the coast inland to an altitude of about 2200 feet. It is only found in the densest part of the forest, and is apparently rather solitary in disposition but not especially moody nor silent. A favorite perch is on some dead branch at the edge of a thicket and from ten to twenty feet from the ground. Here the bird will sit in one position for a long time, every few moments uttering its peculiar cackling-like notes. While thus occupied the bird's attitude is very characteristic; the body is held in an almost horizontal position, the tail perpendicular, and the head thrown well back. While uttering the peculiar notes (song or cackle) the tail is vibrated back and forth quite rapidly. The food is chiefly insects, and they are sometimes taken on the wing. The bird, if disturbed, drops quietly down into the thicket.

The nest I have not yet succeeded in finding, although I have seen the birds carrying nesting material. The egg I can describe only from a badly broken specimen that I took from the oviduct of a female killed March 8, 1893. This egg was white, thickly speckled all over with small chocolate-brown spots.

There is considerable individual variation in the plumage, especially of the females, the general color below varying from a clear dusky slate-gray to a rather dark hair-brown. Some specimens have the belly lightly streaked with white, others are without any indications of streaks. Above the color varies from a blackish slate-color with a faint olive wash to a rather light bistre brown.

NOTES ON THE TRUNK SKELETON OF A HYBRID GROUSE.

BY R. W. SHUFELDT.

ON the 15th of last January (1893), Mr. William Brewster purchased in the markets of Cambridge, Mass., a specimen in the flesh of a hybrid Grouse. He prepared the skin of it for his private collection, and placed the body of the bird in alcohol. Writing me from Cambridge upon the 13th of the following month, he offered me the latter for anatomical investigation, saying at the same time that, as far as he could ascertain, the bird "lacked wholly either testes or ovary." During the latter part of February this spirit specimen came into my possession, and in the letter of transmittal Mr. Brewster further said: "The market-man could tell me nothing as to where it had come from, save that he received it with many other Grouse (all *Tympanuchus americanus*) from a wholesale dealer in Boston."

"It is nearly intermediate in respect to color, markings, and feather development between *T. americanus* and *Pediocætes p. campestris*. It has the neck tufts (only about one inch long, however) of the former and the elongated central tail-feathers of the latter. It had evidently been snared, and killed by wringing the neck." I re-examined the specimen for sex characters (but without a lens, however) and utterly failed to find any trace of generative organs whatever. In April, through the kindness of Mr. True of the National Museum, the alcoholic, which had already been partially skeletonized by myself, was passed into the hands of Mr. F. A. Lucas, to be completed by one of his workmen. Thanks to them, the cleaned bones now lie before me for description. These consist of the femora, the shoulder-girdle (complete), the sternum, the ribs (which had all been cut in two in order to examine for sex characters), the cervico-dorsal vertebræ, the pelvis, and two (proximal ones) coccygeal vertebræ.

This trunk skeleton has several points of considerable interest about it to the ornithologist, and to me it has a special interest inasmuch as many years ago I gave it as my opinion that of all the genera of our North American Grouse, these two, *Pediocætes* and *Tympanuchus*, were the most nearly related to each other. This opinion was based upon my studies of the osteology of the entire group in this country, and it was published in the Twelfth Annual Report of the U. S. Geological and Geographical Survey (Washington, Oct., 1882, p. 700). Our hybrid specimen, now at hand, supports this view. It proves that the genera *Pediocætes* and *Tympanuchus* are so closely affined that the species are fertile *inter se*. But I know of instances among gallinaceous fowl, far more remotely related than these, where successful crosses were produced. I have seen a matured hybrid, the offspring of a common barnyard cock and a guinea hen. The bird was chiefly white in plumage and had large spurs. Mr. Smillie, the well-known photographer of the National Museum, gives me an instance that came under his own personal observation, where a domestic Mallard drake regularly paid court to a certain hen, an ordinary barnyard fowl, but he never ascertained whether any of the eggs she laid were ever placed for hatching, and consequently could not say whether they were fertilized or not.

Here I would also like to invite attention to what Mr. R. Bowdler Sharpe has said upon this point in his very interesting article on 'Ornithology at South Kensington' which appeared in 'The English Illustrated Magazine' for December, 1887. That eminent ornithologist remarks that "instances of cross-breeding in confinement are plentiful. A Goldfinch will mate with a Canary, or one species of Pheasant will interbreed with another species, but in a wild state the instances of hybridization are less frequent, and are commonly confined to game birds. The Hooded Crow (*Corvus cornix*), however, is known to breed with the Carrion Crow (*C. corone*), wherever the ranges of the two species overlap; and in the case of the birds exhibited [in the halls of the South Kensington Museum], a pure-bred Hooded Crow and a pure-bred Carrion Crow will be seen, while the hybrid young ones partake, to a greater or less degree, of the characters of both. The same occurs with the Common Goldfinch (*Carduelis carduelis*) and the Oriental Goldfinch (*C. caniceps*)" (p. 67).

So far as my observation goes, such hybrids usually stand more or less intermediate in size between the parent birds. This appears to have been the case, judging from the trunk skeleton, with the hybrid Grouse now under consideration. A few measurements will show this, and they are given in the subjoined table.

Adult specimens (*Measurements in millimetres.*)	*Length of sternum*	*Length of coracoid*	*Length of scapula*	*Length of pelvis*	*Greatest width of pelvis*	*Length of femur*
Tympanuchus americanus	115	55	75	85	74	72
Hybrid	114.5	48	70	72	59	66
Pediocætes p. campestris	101	48	66	71	57	64

In my osteology of the *Tetraonidæ*, above cited, I have already shown that the cervico-dorsal chain of vertebræ consists numerically of fifteen leading cervicals, if we so designate them, followed by four dorsals that are fused into one piece, and finally a single free dorsal standing between this piece and the pelvic sacrum. This is precisely the arrangement in the vertebral chain of the trunk skeleton of the hybrid Grouse we are now examining. They are characteristically tetraonine, and are each somewhat larger than the corresponding ones in the spinal column of *Pediocætes p. campestris*. But the vertebral ribs of this hybrid, with their costal ribs, are distinctly more like those of the Sharp-tailed Grouse (*Pediocætes*) than they are like the ribs in *Tympanuchus*. My Hayden memoir calls especial attention to the peculiar form of the ribs of the species of the last-named genus of Grouse, in that they, as well as the epipleural appendages they support, are markedly broad and spreading.[1] This is not nearly so much the case in *Pediocætes* nor, as I have just said, in this hybrid bird.

Passing next to the *pelvis*, we meet with a very interesting structure, to the student of the morphology of birds, and it would indeed be hard to conceive of a bone that in its form stands so directly intermediate between the pelvis of *Tympanuchus* and *Pediocætes*. This is the more easily appreciated inasmuch as in the former genus a pelvis is met with that is strikingly dif-

[1] *Osteology of the Tetraonidæ*. Hayden's 12th Annual Report, U. S. Geol. and Geograph. Surv. of the Territories, 1882, p. 680, Plate XI, figs. 79, 80.

ferent from that part of the skeleton in any other kind of North American Grouse. It is approached by the pelvis in *Pediocætes*, but not to such a marked degree as it is by the bone in this hybrid fowl.[1] Viewed laterally, the most obvious character is the remarkable manner in which, upon either side, the post-acetabular part of the ilium far over-arches the lateral surface of the pelvis and the ischiac foramen. To a very moderate extent this is apparent in the pelvis of *Pediocætes*, whereas in the hybrid we have the condition much more pronounced, but not to the extent that it is in the Prairie Hen. Again, in the latter, upon superior view of the pelvis, we note, in the post-acetabular part, that the sacrum is separated from the inner margins of the ilia by quite an interval. This is not nearly so well marked in the hybrid, while in *Pediocætes* those borders are in close contact for their entire lengths. The pubic elements are produced posteriorly, not being as short as they are in *Tympanuchus*, but more as we find them in the Sharp-tail Grouse. In all its minor characters, as I have said above, this pelvis is an exact intermediate between the pelves as they occurred in its parents. Such an observation is quite applicable, too, to the *sternum*, which appears to be just a shade off from that bone in *Tympanuchus*, but differs in one insignificant minor character in that the antero-superior produced portion of either costal process in the hybrid is somewhat lengthened, very narrow, and points directly to the front. In all, the elements of the pectoral arch or shoulder-girdle are very much alike, though the individual bones of the hybrid rather more closely simulate the corresponding ones in my skeletons of the Prairie Hens. More particularly is this the case in the form of the much expanded hypocleidium of the os furcula, this expansion being considerably narrower antero-posteriorly in *Pediocætes* than it is in *Tympanuchus* or in this hybrid. For the diameter indicated, in the last two it measures 12 millimetres, while in the Sharp-tailed Grouse it measures but 9 mm. or less.

Excepting in the matter of size, the characters of the femur of this hybrid Grouse are in exact agreement with those of the femora of the parent species. We note, however, that the calibre of its shaft is relatively, as well as actually, stouter than it is in

[1] *Loc. cit.* Plate XII, figs. 83, 84.

Pediocætes. Apart from this minor point, the femur of this hybrid fills the ideal place in a series of three that otherwise insensibly intergrade in all particulars.

This completes my account of the few bones that I have of the skeleton of this very interesting specimen, and in conclusion it but remains for me to thank, as I here do, Mr. Brewster for his kindness in having placed them at my disposal for description. It is fortunate that the specimen fell into such excellent hands, for we fear that with many others the fate of the body would have been quite different. I refer to that thoughtless class of ornithologists who seem to think that their science begins and ends when they have "shot a bird, skinned it, and then thrown away the characters." This is the first hybrid of this kind that has ever come under my observation, but I am inclined to believe that others, more or less like it, will be met with in the future. Were it possible to domesticate these two genera of Grouse, I believe they would frequently cross under such conditions, and very likely the vast majority of the eggs would prove to be fertile.

RECENT LITERATURE.

Ornithology of the Death Valley Expedition. — Part II[1] of the report on the Death Valley Expedition, organized and carried on under authority of the U. S. Department of Agriculture in 1891 by Dr. C. Hart Merriam, Chief of the Division of Ornithology and Mammalogy, is published in advance of Part I, and consists of eight special reports, as follows: (1) Report on Birds, by A. K. Fisher, M. D.; (2) Report on Reptiles and Batrachians, by Leonhard Stejneger; (3) Report on Fishes, by Charles H. Gilbert, Ph. D.; (4) Report on Insects, by C. V. Riley, Ph. D; (5) Report on Mollusks, by R. E. C. Stearns, Ph. D.; (6) Report on Desert Trees and Shrubs, by C. Hart Merriam, M. D.; (7) Report on Desert Cactuses and Yuccas, by C. Hart Merriam, M. D.; (8) List of

[1] The Death Valley Expedition, a Biological Survey of parts of California, Nevada, Arizona, and Utah. Part II.=North American Fauna, No. 7, pp. 402, pll. xiv, frontispiece, two cuts in text, and 5 maps. U. S. Department of Agriculture, Division of Ornithology and Mammalogy. Washington, 1893. (Published May 31, 1893.)

Localites, by T. S. Palmer. Part I, not yet ready for the press, will contain "the general report (itinerary, description of the region, and discussion of life zones) and the report on the mammals."

Dr. Fisher's report on the birds is entitled 'Report on the Ornithology of the Death Valley Expedition of 1891, comprising notes on the Birds observed in southern California, southern Nevada, and parts of Arizona and Utah,' and occupies pp. 7–158. It comprises an annotated list of 290 species, all of the observations made by the different members of the Expedition being combined into one general report, instead of the principal localities being treated separately. At the end of the main list, however, are given a 'List of Birds observed in Death Valley, California' (pp. 150–152), numbering 78 species, and a 'List of the birds found in Owens Valley, California' (pp. 153–158), numbering 137 species. Both of these supplemental lists are briefly annotated, and serve to throw sharply into relief the ornithological peculiarities of these two extremely interesting localities. We are also promised that "a few local lists will be found under particular areas in Part I,"—a very wise arrangement, from the standpoint of convenience in studying the faunal aspects of particular localities.

In addition to the observations made by the main expedition, a number of side trips were undertaken to special localities, thus greatly increasing the number of species noted. "Among these trips may be mentioned one made by Dr. Merriam and Mr. Bailey, who extended their observations as far east as St. George, Utah." A trip was also made "by Mr. Nelson along the coast from San Simeon to Carpenteria, and one to Monterey by Mr. Bailey."

In this way the list is made to cover a very large area, extending from the coast of southern California eastward to some distance into Arizona. The observations appear to have been made mainly by Drs. Merriam and Fisher and Messrs. Vernon Bailey, B. H. Dutcher, E. W. Nelson, T. S. Palmer, and F. Stephens. The paper is of course an exceedingly important contribution to our knowledge of the distribution of birds over the area in question, especially as regards such previously little-known portions as Death Valley and its immediate vicinity. Outside of this area the known range of a number of species was considerably extended to the eastward or northward, according to the species. Thus the range of the Plumed Partridge (*Oreortyx pictus plumiferus*) was carried eastward to Mount Magruder in Nevada, and to the desert ranges of southern California west of Death Valley. Baird's Woodpecker (*Dryobates scalaris bairdi*) was found to range northward as far as the Santa Clara Valley in southwestern Utah, and the range of Scott's Oriole (*Icterus parisorum*) was carried equally far north.

The Texas Nighthawk (*Chordeiles acutipennis texensis*) and the Costa's Hummingbird (*Calypte costæ*) were also found to range northward to about the same line (parallel of 38°), and a single specimen of the Vermilion Flycatcher (*Pyrocephalus rubineus mexicanus*) was taken

at St. George, Utah. Especially interesting also is the finding of the Gray-crowned Finch (*Leucosticte tephrocotis*) breeding in the Sierra Nevada and White Mountains in eastern and southern California, its breeding grounds being not only previously unknown, but the genus even had not before been reported from this region. As Dr. Fisher remarks: "The knowledge that this bird breeds as stated makes its distribution in relation to the other species of the genus a little more clear." Much light was thrown also upon the habitat of Thurber's Junco (*Junco hyemalis thurberi*), which was found to breed commonly in most of the desert ranges of southeastern California, as well as in the southern portion of the Sierra Nevada.

Of the California Vulture Dr. Fisher writes: "It was with considerable surprise and pleasure that we found the California Vulture still tolerably common in certain localities west of the Sierra Nevada, in California." At San Emigdio, in Kern County, "Mr. Nelson found it quite common in October, and was told that it became very numerous there in winter."

The annotations, often quite extended, relate almost exclusively to the distribution of the species, being not at all technical and not to any great extent biographical.

While the other special papers in the 'Report' hardly call for particular remark in the present connection, it should be noted that Mr. Palmer's detailed descriptive list of the localities visited by the Death Valley Expedition is a most important and convenient adjunct to the Report, rendering it possible, in connection with the excellent map of the region traversed, to locate nearly every locality mentioned, a large number of which are for the first time indicated on any accessible map.

Dr. Merriam's notes on the distribution of the trees and shrubs, and the yuccas and cactuses, are also of special interest to zoölogists as well as botanists, aside from their more practical and general interest. "Most of the desert shrubs," say Dr. Merriam, "are social plants and are distributed in well-marked zones, the vertical limits of which are fixed by the temperature during the period of growth and reproduction. . . . The principal plant zones conform also to the animal zones, as defined by the limits of distribution of terrestrial mammals, birds, and reptiles." The limits of distribution, however, in the case of plants are much more readily traced than in the case of animals, and thus plants, and particularly trees and shrubs, serve admirably in aiding to determine natural areas of distribution. Of special interest in this connection are maps 3 and 4, giving respectively the distribution of Leconte's Thrasher (*Harporhynchus lecontei*) and the creosote bush, where at first sight the colored areas seem to be almost identical. "The creosote bush (*Larrea tridentata*) is the most conspicuous, most widely distributed, and best known bush of the torrid deserts of the southwest, where it covers the gravel soils up to a certain line, which probably marks the southern limit of killing frost" (p. 286). Map 2 illustrates the "Lower Division of the Lower Sonoran Life Zone," which is "the area in which the raising

astic in the extreme, being always ready to sacrifice everything in the interest of the birds. Professional engagements, however numerous or pressing, had to be postponed or were forgotten when any one was encountered who could impart a new ornithological fact or who indeed but proved to be a good listener when birds were under discussion. He thus acquired a very considerable fund of information bearing upon the avian fauna of his chosen State. His first extended presentation of the results of his observations appeared in the 'Bulletin of the Minnesota Academy of Natural Sciences' for 1874, in the shape of an annotated list of the birds of the State. It was in reality more nearly a list of the birds of Hennepin County, the locality where the author resided. From time to time Dr. Hatch published additional articles in the nature of 'reports of progress' and partial revisions and corrections of the original list. At first these were printed in the Bulletins of the Minnesota Academy. Later, after his appointment to the position of State Ornithologist by the Board of Regents of the University of Minnesota, they appeared in the annual reports of the State Geological and Natural History Survey. In 1880 a second 'List' was published in the Ninth Annual Report of the Survey. The annotations were very brief, and in other respects the list was a disappointment to those awaiting its appearance. Not long after this a final and much more voluminous report was promised and the manuscript it now seems was prepared and offered for publication, but for various reasons its appearance has been delayed from time to time until now through the efforts of the present State Zoölogist, Prof. Henry F. Nachtrieb, it is presented as No. I of a series of zoölogical reports which it is intended shall be issued under the supervision of the State Zoölogical Survey. It was certainly due Dr. Hatch now that he is far advanced in years, no longer a resident of the State, and his long labors in behalf of Minnesota birds probably ended so far at least as any active participation is concerned, that the results of his work should be preserved in permanent form by the State in which he labored. The volume has appeared as 'Notes' instead of as a 'Report' upon the birds of Minnesota, and is much less pretentious and elaborate in its general make-up than was originally intended. The plan at one time, if the writer is not mistaken, included illustrations. There are none with the present book.

An analysis of the 'Notes' shows 295 species and 7 varieties formally credited to the State, and several others referred to under other headings as, for example, *Chen cærulescens* under *C. hyperborea* and *Junco hyemalis oregonus* and *Junco annectens* under *J. hyemalis*. Some fifteen species are included upon what would seem to be, in view of the unusual character of the records, insufficient data. These would have very properly formed a tentative or provisional list. They are: *Colymbus nigricollis californicus*, *Urinator arcticus*, *Larus atricilla*, *Pelecanus fuscus*, *Anas cyanoptera*, *Somateria spectabilis*, *Branta nigricans*, *Nycticorax violaceus*, *Porzana jamaicensis*, *Picoides americanus*, *Pica pica hudsonica*, *Corvus ossifragus*, *Vireo noveboracensis*, *Merula migratoria propinqua*

and *Sialia mexicana*. Several other species to which more or less particular interest attaches might perhaps be included in this list, there being a general vagueness and lack of detail in the records relating to them. Indeed it will probably be felt by the critical reader that throughout the book a little closer adherence to dry detail and a greater array of facts and positive statements might have been introduced without detracting from its literary merit, and would have much enhanced the value of the work to students of ornithology.

To be more exact, *Ammodramus caudacutus* should have been *A. c. nelsoni*, *Seiurus noveboracensis*, *S. n. notabilis* and *Quiscalus quiscula*, *Q. q. æneus*. There are several similar distinctions of more recent date and perhaps less importance that might have been made.

The following Minnesota birds find no place in the 'Notes': *Larus franklini*, *Tringa fuscicollis*, *Tringa alpina pacifica*, *Speotyto cunicularia hypogæa*, *Chordeiles virginianus henryi*, *Tyrannus verticalis*, *Leucosticte tephrocotis*, *Acanthis linaria rostrata*, *Rhynchophanes mccownii*, *Ammodramus henslowii*, *Zonotrichia intermedia* and *Seiurus motacilla*. Some of these are common and well known species with which Dr. Hatch is well acquainted and their omission is due without doubt to some neglect or oversight. Several are only stragglers, but have been conspicuously reported, the identification resting upon the capture and preservation of specimens, which it is needless to say is the only entirely satisfactory foundation for the recording of new or exceptional facts. The volume is without tables, general summaries or any description of the topography of the State. There is no discussion of the faunal areas represented within the limits of Minnesota, nor is there any reference whatever to the interesting features presented by the State as a zoögeographical area and so well exemplified in its bird life. This is the more to be regretted since the author from his long residence in the State should be exceptionally well fitted to treat this phase of the subject in an intelligent and interesting manner. The classification and nomenclature are those of the A. O. U. Check-list. Following each biographical sketch is a statement of specific characters adapted for the most part from the descriptions given in the Ninth Volume of the Pacific Railroad Survey Reports. In order to assist the many who will use the 'Notes,' who know birds only by their common names, Professor Nachtrieb has added a carefully compiled list of common names. A very good index, also prepared by Professor Nachtrieb, completes and enriches these nearly five hundred pages of bird lore, the appearance of which has been so long and expectantly looked forward to by students of Minnesota ornithology. — T. S. R.

Rhoads's Observations on British Columbia and Washington Birds.[1]— This paper is a final report of a collecting trip, some of the results of which have been already given in 'The Auk' (Vol. X, pp. 16–24). The

[1] The Birds observed in British Columbia and Washington during Spring and Summer, 1892. By Samuel N. Rhoads.—Proc. Acad. Nat. Sci. Phila., 1893, pp. 21–65.

author was in the field from March to September, passing the first three months at five places in the neighborhood of Puget Sound and the Straits of Georgia, and spending the rest of the time in the interior of British Columbia where he made short visits to nine different points widely unlike in their climatic conditions. In an introduction of a few pages each locality is briefly described, and some generalizations are given in regard to the distribution, and causes of distribution, of British Columbia birds. Some of these conclusions—though founded largely on conjecture—are stated with the positiveness of established facts, and, with other sweeping statements that appear here and there through its pages, suggest—what seems to be the principal fault in the paper—a certain lack of care and thoroughness in its preparation.

In one of the opening paragraphs Mr. Rhoads remarks that "the bibliography of Washington and British Columbia ornithology is very meagre," and his own knowledge of its literature unhappily appears to be so, to judge from the long array of species which he proceeds to add to the list of birds known to occur in each of these districts. Readers who have been more fortunate than he in their bibliographical researches will hardly be surprised to find that about half of these "additional species" have been recorded before, but they may wonder at the carelessness which enables the author to swell his British Columbia list with species mentioned by Chapman and Fannin (whose recent paper he does refer to), and even to "add" to the Washington record two birds whose type specimens undoubtedly came from that State. The latter are *Dryobates p. gairdnerii* and *Chætura vauxi*, while among other species that are wrongly given as novelties in one or the other list are *Colymbus holbœlli*, *Brachyramphus marmoratus*, *Larus californicus*, *Larus brachyrhynchus*, *Lophodytes cucullatus*, *Spatula clypeata*, *Aix sponsa*, *Aythya americana*, *Anser albifrons gambeli*, *Fulica americana*, *Totanus flavipes*, *Oreortyx pictus*, *Cathartes aura*, *Circus hudsonius*, *Falco columbarius suckleyi*, *Asio wilsonianus*, *Bubo virginianus subarcticus*, *Glaucidium gnoma*, *Cypseloides niger*, *Pica pica hudsonica*, *Agelaius phœniceus*, *Progne subis*, *Sitta canadensis*, and *Parus atricapillus occidentalis*.

The main body of the paper is a list of the birds seen during the trip. By covering so much and such varied ground, by great activity in the field, and by inspection of the local collections that came in his way, Mr. Rhoads has been able to include a remarkably large number of species, in all (reckoning in subspecies) 260. In dividing his time between so many localities his object appears to have been to make a comparative study of the faunal peculiarities of the different parts of the territory included in British Columbia. This purpose is one whose fulfilment is greatly to be desired, but it seems doubtful whether the limited opportunities furnished by one season's work of a single observer—even as energetic and tireless an explorer as Mr. Rhoads—might not have been devoted more profitably to a more thorough investigation of the fauna of

some one of the interesting localities he visited. Nevertheless there are a great many scattered items—too many indeed for individual mention of any of them here—that are of interest and that add largely to our knowledge especially concerning details of distribution of some of the species.

In regard to the status of several subspecies the author reaffirms his opinions given in the article above referred to. In some of these cases—*Corvus caurinus*, for example—he appears to be right, but there are others where his conclusions are not so happy. Such forms, for instance, as *Melospiza lincolni striata* and *Sylvania pusilla pileolata* show characters that even one who runs at Mr. Rhoads's hasty pace may easily read, and there are other cases of subspecies entered on the list that make one wonder whether all his identifications would be sustained were the collections on which they are based to be carefully studied by some more experienced ornithologist. In fact he runs atilt at more than one long-accepted conclusion in such a light-hearted spirit that it is hard to avoid suspecting him of superficiality in his investigations, a suspicion that—in two cases at least—is by no means allayed by Mr. Brewster's recent determinations (antea, pp. 236–237) of some material from the same region.—C. F. B.

Minor Ornithological Publications. — **'Shooting and Fishing.'** —The following record (Nos. 2518–2610) includes all the ornithological articles of importance in the first thirteen volumes (May, 1885–April 20, 1893) of 'Shooting and Fishing.' This journal, which is published in Boston, was first issued under the title of 'The Rifle'; the present name was assumed in No. 5 of Vol. 4.

2518. *A Specimen of Hutchins Goose.* By Ben Bent [= Frank S. Pinckney]. '*Shooting and Fishing*,' Vol. 5, No. 7, Dec. 13, 1888, p. 134.

2519. *That Last Woodcock.* By Snap Shot. *Ibid.*, Vol. 6, No. 18, Aug. 29, 1889, pp. 352–353. — At Calais, Maine, Nov. 20.

2520. *Observations on the Fall Flight of Woodcock. — 1889.* By C. A. B. [ramble]. *Ibid.*, Vol. 7, No. 5, Nov. 28, 1889, p. 89.

2521. *Snipe in December.* By R. Greenwood [= A. C. Gould]. *Ibid.*, No. 9, Dec. 26, 1889, p. 174.

2522. *Habits of the Ruffed Grouse.* By Small Shot. *Ibid.*, No. 14, Jan. 30, 1890, p. 273.

2523. *Ways of the Ruffed Grouse.* By Paul Pastnor [= James Buckham]. *Ibid.*, No. 15, Feb. 6, 1890, pp. 292–293.

2524. *The Woodcock in Nova Scotia.* By Edward Jack. *Ibid.*, No. 17, Feb. 20, 1890, pp. 332–333.

2525. *Some Notes on Woodcock.* By Paul Pastnor [= James Buckham]. *Ibid.*, p. 333.

2526. *Notes on Woodcock.* By Saint Croix [= C. A. Bramble]. *Ibid.*, No. 21, March 20, 1890, p. 413.

2527. *The Food of Woodcock.* By William Couper. *Ibid.*, No. 23, April 3, 1890, p. 458.

[**Shooting and Fishing.**—Continued.]

2528. *The Food of Woodcock.* By Saint Croix [= C. A. Bramble]. *Ibid.*, No. 25, April 17, 1890, p. 488.

2529. *Brant Shooting at Cape Cod — Spring, 1890.* By W. Hapgood. *Ibid.*, Vol. 8, No. 2, May 8, 1890, p. 28.

2530. *The Food of Woodcock.* By William Couper. *Ibid.*, pp. 32–33.

2531. *The Food of Woodcock.* By Saint Croix [= C. A. Bramble]. *Ibid.*, No. 4, May 22, 1890, p. 70.

2532. *Where Black Ducks Breed.* By Saint Croix [= C. A. Bramble]. *Ibid.*, No. 6, June 8, 1890, p. 112.

2533. *The Food of Woodcock.* By Wm. Couper. *Ibid.*, No. 7, June 12, 1890, pp. 131–132.

2534. *Sheldrake Should be Exterminated.* By St. Croix [= C. A. Bramble]. *Ibid.*, No. 8, June 19, 1890, p. 146.

2535. *Notes from Plymouth, Mass.* By Gulch [= Herbert W. Bartlett]. *Ibid.*, pp. 146–147. — Contains a note on *Ectopistes migratorius.*

2536. *Shore Bird Shooting on the New England Coast.* By Fletcher Osgood. I, *ibid.*, No. 21, Sept. 18, 1890, pp. 412–413; II, *ibid.*, No. 22, Sept. 25, 1890, pp. 430–431; III, *ibid.*, No. 23, Oct. 2, 1890, pp. 470–471; IV, *ibid.*, No. 25, Oct. 16, 1890, pp. 491–492 [*Treats of Totanus flavipes, T. melanoleucus*, and *Macrorhamphus griseus*]; V, *ibid.*, No. 26, Oct. 23, 1890, pp. 513–514 [*Charadrius dominicus* and *Numenius borealis*]; VI, *ibid.*, Vol. 9, No. 1, Oct. 30, 1890, p. 12 [*Limosa hæmastica, L. fedoa*, and *Tringa maculata*]; VII, *ibid.*, No. 4, Nov. 20, 1890, pp. 71–72 [*Symphemia semipalmata, Charadrius squatarola*, and *Tringa canutus*]; VIII, *ibid.*, No. 7, Dec. 11, 1890, p. 134 [*Arenaria interpres, Numenius hudsonicus*, and *N. longirostris*]; IX, *ibid.*, No. 8, Dec. 18, 1890, pp. 149–150 [*Bartramia longicauda, Ægialitis vocifera, Charadrius squatarola, C. dominicus, Totanus melanoleucus, Bartramia longicauda* and *Numenius borealis*]; X, *ibid.*, No. 12, Jan. 15, 1891, pp. 231–232 [*Hæmatopus palliatus, Recurvirostra americana, Himantopus mexicanus, Limosa fedoa, L. hæmastica, Symphemia semipalmata, Numenius longirostris* and *N. hudsonicus*]; XI, *ibid*, No. 16, Feb. 12, 1891, p. 308 [*Ægialitis vocifera, Arenaria interpres, Macrorhamphus griseus, Tringa maculata, T. canutus, Totanus flavipes*]; XII, *ibid.*, No. 21, March 19, 1891, pp. 409–410 [*Ægialitis semipalmata, Æ. meloda, Phalaropus tricolor, P. lobatus, Crymophilus fulicarius, Micropalama himantopus, Ereunetes pusillus, Tringa minutilla*, and *T. bairdii*]; XIII, *ibid.*, No. 22, March 26, 1891, pp. 431–432 [*Tringa fuscicollis, T. maritima, T. alpina pacifica, T. ferruginea, Calidris arenaria, Totanus solitarius, Actitis macularia, Tryngites subruficollis*, and *Pavoncella pugnax*]. — An important series of articles, containing valuable original matter. The earlier parts are not ornithological, but for the sake of completeness they are included in this record.

2537. [*Woodcock about Manchester, New Hampshire*]. *Ibid.*, Vol. 9, No. 4, Nov. 20, 1890, pp. 72–73. — From the 'Manchester Mirror and American.'

[Shooting and Fishing.—Continued.]

2538. *Turnstone Plover.* By G. [= Herbert W. Bartlett]. *Ibid.*, No. 9, Dec. 25, 1890, p. 178. — *Arenaria interpres* on Cape Cod, Mass.

2539. *Turnstone Plover.* By C. T. Canterbury. *Ibid.*, No. 10, Jan. 1, 1891, p. 197.

2540. *The Turnstone Again.* By Fletcher Osgood. *Ibid.*

2541. *Notes on Shore Birds.* By R. H. Blain. *Ibid.*, No. 11, Jan. 8, 1891, p. 211. — *Ægialitis vocifera.*

2542. *Gunlock to Prof. Osgood.* By Gunlock [= C. T. Canterbury]. *Ibid.*, No. 14, Jan. 29, 1891, p. 274. — Notes on several Massachusetts shore birds.

2543. *To "Gunlock".* [By Fletcher Osgood.] *Ibid.*, No. 16, Feb. 12, 1891, pp. 312–313. — Reply to the last.

2544. *The Brant Have Arrived.* By Gunlock [= C. T. Canterbury]. *Ibid.*, No. 17, Feb. 19, 1891, p. 326. — At Chatham, Mass.

2545. *New England Shore Birds.* By Gunlock [= C. T. Canterbury]. *Ibid.* — *Tringa maculata* and *Totanus flavipes.*

2546. *The "Monomoy" Brant Shooter. Ibid.*, No. 21, March 19, 1891, p. 413.

2547. *A Specimen of the Labrador Duck. Ibid.*, No. 22, March 26, 1891, p. 425.

2548. *The Valley Quail of Southern New Mexico.* By W. *Ibid.*, No. 24, April 9, 1891, p. 471. — *Callipepla gambeli* (?).

2549. *Early Dates for Woodcock.* By M. P. [and the editor]. *Ibid.*, No. 25, April 16, 1891, p. 491. — In Maine and Massachusetts.

2550. *The Upland Plover.* By O. W. Hard. *Ibid.*, No. 26, April 23, 1891, p. 508.

2551. *Water-fowl Shooting in New England.* By Fletcher Osgood. Part I, *ibid.*, Vol. 10, No. 1, April 30, 1891, pp. 6–7 [*Anas boschas* and *Anas obscura*]; part II, *ibid.*, No. 3, May 14, 1891, p. 46 [*Anas obscura*]; part III, *ibid.*, No. 5, May 28, 1891, pp. 90–91 [*Anas obscura*]; part IV, *ibid.*, No. 7, June 11, 1891, pp. 130–131 [*Anas obscura*]; part V, *ibid.*, No. 9, June 25, 1891, pp. 170–171 [*Anas strepera*, *Anas americana*, and *Dafila acuta*]; part VI, *ibid.*, No. 19, Sept. 3, 1891, p. 370 [*Dafila acuta*].

2552. *Passenger Pigeons.* By A. N. Cheney. *Ibid.*, Vol. 10, No. 2, May 7, 1891, p. 36. — Near Glen Falls, N. Y.

2553. *The Wild Pigeon in Massachusetts.* By H. [= Reuben Harwood]. *Ibid.*, No. 3, May 14, 1891, pp. 46–47.

2554. *Brant Shooting at Chatham, Mass. Spring*, 1891. By W. Hapgood. *Ibid.*, No. 4, May 21, 1891, p. 70.

2555. *Shore Birds at Chatham, Mass.* By Gunlock [= C. T. Canterbury]. *Ibid.*, No. 6, June, 4, 1891, p. 107.

2556. [*Charadrius squatarola and Totanus melanoleucus at Chatham, Mass.*]. By Gunlock [= C. T. Canterbury]. *Ibid.*, No. 10, July 2, 1891, p. 197.

2557. *Shore Bird Shooting.* By Gunlock [= C. T. Canterbury] and Shorebird [= A. C. Gould]. *Ibid.*, No. 14, July 30, 1891, p. 268. — At Chatham, Mass.

[**Shooting and Fishing.**—Continued.]

2558. *Notes from Maine.* By L. [= L. Lewis]. *Ibid.*, pp. 271–272. — Water birds at Egg Rock near New Harbor, Maine.

2559. *My Summer Outings.* By Ralph Greenwood [=A. C. Gould]. *Ibid.*, No. 17, Aug. 20, 1891, pp. 326–327, No. 18, Aug. 27, 1891, pp. 349–350.

2560. [*Shore Birds at Chatham, Mass.*]. By Gunlock [= C. T. Canterbury]. *Ibid.*, No. 17, Aug. 20, 1891, p. 335.

2561. *Cape Codiana.* By Fletcher Osgood. *Ibid.*, No. 23, Oct. 1, 1891, pp. 449–450. — Mention of *Mimus polyglottos.*

2562. *The Wild Pigeon.* By Swain. *Ibid.*, p. 450. — At Greenfield, New Hampshire.

2563. *Game Notes.* By Old Gunner, G., and the editor [all = A. C. Gould]. *Ibid.*, No. 25, Oct. 15, 1891, p. 496. — Contains notes on *Limosa hæmastica*, *Charadrius squatarola*, and *Aix sponsa.*

2564. *Enemies of the Grouse.* By R. S. F [oss]. *Ibid.*, No. 26, Oct. 22, 1891, pp. 509–510. — *Bonasa umbellus togata.*

2565. *Woodcock Shooting in New England.* Editorial. *Ibid.*, Vol. 11, No. 1, Oct. 29, 1891, p. 5. — Migration.

2566. *The Migration of Grouse.* By M. G. *Ibid.*, pp. 9–10. — *Bonasa umbellus.*

2567. *Flight of the Ruffed Grouse.* By Ruffed Grouse. *Ibid.*, No. 2, Nov. 5, 1891, pp. 32–33. — Other habits also.

2568. *Scarcity of Grouse.* Editorial. *Ibid.*, No. 3, Nov. 12, 1891, pp. 45–46. — *Bonasa umbellus.*

2569. *Where are the Grouse?* By New England. *Ibid.*, No. 4, Nov. 19, 1891, pp. 70–71.

2570. *Scarcity of Ruffed Grouse.* By Taxidermist. *Ibid.*, p. 72. — See also p. 73.

2571. *Hybridism, Albinism, and Melanism.* By M[anly Hardy]. *Ibid.*, No. 6, Dec. 3, 1891, p. 106.

2572. [*Wild Turkey in Michigan.*] By M. L. *Ibid.*, p. 107.

2573. *The Game Season of 1891.* Editorial. *Ibid.*, No. 8, Dec. 17, 1891, p. 145. — *Bonasa umbellus* especially.

2574. *Some More Ruffed Grouse Notes.* By F. W. L. *Ibid.*, No. 10, Dec. 31, 1891, p. 187.

2575. *Check List of the Game Birds of North America.* By Frank A. Bates. *Ibid.*, No. 12, Jan. 14, 1892, pp. 229–230; No. 13, Jan. 21, 1892, pp. 251–252; No. 14, Jan. 28, 1892, p. 269; No. 19, March 3, 1892, p. 366; No. 20, March 10, 1892, pp. 390–391; No. 25, April 14, 1892, pp. 491–492; Vol. 13. No. 23, March 30, 1893, pp. 464–465; No. 26, April 20, 1893, p. 524. — A brief description is given of each species, and a short statement of its distribution and habits.

2576. *Woodcock in Confinement.* Editorial. *Ibid.*, Vol. 11, No. 25, April 14, 1892, p. 488.

2577. *Brant Shooting at Cape Cod.* By G. H. [= A. C. Gould]. *Ibid.*

[**Shooting and Fishing.**—Continued.]

2578. *Boston Notes.* By Gleaner [= A. C. Gould]. *Ibid.*, Vol. 12, No. 1, April 28, 1892, p. 8. — Notes on various birds in eastern Massachusetts, including *Passerella iliaca*, *Numenius longirostris*, *Macrorhamphus griseus*, and *Ionornis martinica*.

2579. *Brant Shooting at Chatham, Mass.* By G. E. N. [= A. C. Gould]. *Ibid.*, p. 13.

2580. *Brant Shooting at Monomoy, Spring, 1892.* By W. Hapgood. *Ibid.*, No. 4, May 19, 1892, p. 65.

2581. *The Moulting Woodcock.* By Ignorance [= W. W. Castle]. *Ibid.*, p. 66.

2582. *Habits of the Woodcock.* By H. Austen. *Ibid.*, No. 5, May 26, 1892, p. 85.

2583. *Remarkable Flight of Phalaropes at Chatham, Mass.* By G. E. N. [= A. C. Gould]. *Ibid.*, p. 86. — See also Auk, IX, 296, 298, 299.

2584. *A May Morning on Chatham Flats.* By Shore Bird [= N. E. Gould]. *Ibid.*, No. 6, June 2, 1892, pp. 105–106.

2585. [*Moulting Woodcock.*] By F. [= R. S. Foss]. *Ibid.*, p. 106.

2586. *The Moulting Woodcock.* By "Y" [= Charles Francis Hardy]. *Ibid.*, No. 7, June 9, 1892, p. 125.

2587. *The Woodcock Nesting.* By E. Sprague Knowles. *Ibid.*, No. 13, July 21, 1892, p. 246. — With illustrations from photographs.

2588. *Chatham Items.* Editorial. *Ibid.*, p. 251. — *Charadrius dominicus*, *C. squatarola* and *Macrorhamphus griseus*.

2589. *Sportsmen of Massachusetts.* By John Fottler, Jr., Henry J. Thayer, Edw. E. Hardy, Edw. Brooks, and Outram Bangs. *Ibid.*, No. 14, July 28, 1892, p. 265. — Circular in regard to the introduction of game birds into Massachusetts, giving statistics of their work.

2590. *Greenwood's Gleanings.* By R. G. [= A. C. Gould]. *Ibid.*, No. 18, Aug. 25, 1892, pp. 345–346. — Notes on *Camptolaimus labradorius*, *Tringa ferruginea*, and *Tryngites subruficollis*.

2591. *Shore Bird Shooting in Massachusetts.* By Ralph Greenwood [= A. C. Gould]. *Ibid.*, No. 19, Sept. 1, 1892, pp. 365–366. — Notes on a number of species occurring at Chatham.

2592. *Food Habits of Hawks and Owls in Maryland.* By H. H. Miller. *Ibid.*, p. 366.

2593. *Upland Plover Shooting in Vermont.* By Ralph Greenwood [= A. C. Gould]. *Ibid.*, p. 372.

2594. *Greenwood's Gleanings.* By Ralph Greenwood [= A. C. Gould]. *Ibid.*, No. 23, Sept. 29, 1892, pp. 455–456; No. 25, Oct. 13, 1892, pp. 492–494. — Notes on *Bonasa umbellus* and *Philohela minor*.

2595. *Late Flight of Swallows.* By W. Hapgood. *Ibid.*, No. 25, Oct. 13, 1892, p. 495.

2596. *The Gambel's Partridge in Massachusetts* By Henry J. Thayer. *Ibid.*, Vol. 13, No. 1, Oct. 27, 1892, p. 10.

2597. *Hunting Notes from Maine.* By Sumner L. Crosby. *Ibid.*, p. 11. — *Philohela minor* at Bangor.

[Shooting and Fishing.—Continued.]

2598. *Ruffed Grouse.* By H. [= Manly Hardy]. *Ibid.*, No. 5, Nov. 24, 1892, p. 85.

2599. *Upland Plover Shooting.* By Paul Pastnor [= James Buckham]. *Ibid.*, p. 87.

2600. *Greenwood's Gleanings.* By Ralph Greenwood [= A. C. Gould]. *Ibid.*, No. 6, Dec 1, 1892, pp. 108–110. — Notes on *Philohela minor* and *Bonasa umbellus*, p. 109.

2601. *Food of Woodcock.* By J. W. G. D. *Ibid.*, No. 7, Dec. 8, 1892, p. 129.

2602. *The Upland Plover.* By John G. Smith. *Ibid.*

2603. *The Weight of Ruffed Grouse.* By H. [= Manly Hardy]. *Ibid.*

2604. *Winter Hunting in Canada.* By E. T. D. Chambers. *Ibid.*, No. 8. Dec. 15, 1892, pp. 147–149. — Notes on *Lagopus lagopus*, p. 147.

2605. *Greenwood's Gleanings.* By R. G. [= A. C. Gould]. *Ibid.*, No. 13, Jan. 19, 1893, pp. 262–263. — Ducks at Chatham, Mass., in winter, p. 263.

2606. *Winter Notes from Plymouth, Mass.* By 'Repeater' [= Herbert W. Bartlett]. *Ibid.*, No. 15, Feb. 2, 1893, p. 302.

2607. *Greenwood's Gleanings.* By Ralph Greenwood [= A. C. Gould]. *Ibid.*, pp. 304–305. — Winter birds at Chatham, Mass., and notes on *Colinus virginianus*, p. 305.

2608. *Notes from Ohio.* By C. E. S. *Ibid.*, No. 23, March 30, 1893, p. 461. — *Haliæetus leucocephalus.*

2609. *Greenwood's Gleanings.* By Ralph Greenwood [= A. C. Gould]. *Ibid.*, pp. 465–466. — Notes on *Aquila chrysaëtos* in Colorado, p. 465.

2610. *New York and Vicinity Shooting Notes.* [By Jacob Pentz.] *Ibid.*, No. 24, April 6, 1893, pp. 487–490. — *Quiscalus quiscula*, p. 489. —C. F. B.

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Meyer, A. B. (1) *Goura beccarii huonensis* n. subsp. (Orn. Jahresb., April, 1893.) (2) *Aquila rapax* (Temm.) von Astrachan, nebst Bemerkungen über verwandte Formen, besonders *Aquila bocki* Hom. (Abh. Gesell. 'Isis' in Dresden, No. 11, 1892.)

Piers, Harry. On the Nidification of the Winter Wren in Nova Scotia. Trans. Nova Scotia Inst. Sci. 2d Ser. Vol. I, pp. 203–207.)

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GENERAL NOTES.

Notes on Cassin's Auklet.—Some notes I made on *Ptychoramphus aleuticus* while on Santa Catalina Island, Cala., may be of interest to others. I arrived there March 15, and left April 3, 1893. For three or four days after my arrival the sea was rough and the birds appeared nearer shore than later in calm weather. The choppy waves made shooting difficult, and the birds were wild. During the better weather that followed the birds must have gone some miles out, for one day at least I saw none

in half a day's rowing. The first day's work was about the best, and of the five taken that day four were in good condition though none were fat. Later on all birds taken were thin, some being very thin, and five were found floating dead, three of which I saved. It would seem that those that remained until the end of the month were unable to migrate, either because of disease or old age. In one female taken March 23 some ova were as large as No. 10 shot. None of the other females taken showed any tendency toward breeding. Several birds taken show small irregular patches of white on the cheeks, probably signs of immaturity. The majority retained the old faded wing and tail feathers.

The flight of *P. aleuticus* is swift, steady, and low, just clearing the waves. The white under parts show in flight. They dive well, and can stay under water two minutes or more. They swim fast for so small a bird. On being chased with a boat they often preferred diving to flight, and then their speed was greater than when swimming, requiring sharp rowing to get within shooting distance. They often changed their course while under water, and several times baffled me in that way. They are so small that one cannot see them very far in rough water. Wounded birds observed at short distances were observed to use their wings in diving, and probably in all cases diving is simply a flight under water.

The last day that I was out I ran down two sick birds that I knocked over with an oar without having to shoot them, and another I caught alive without hurting it, but it died as I came ashore. March 30 I shot one at close range with dust shot, which revived after being thrown in the bottom of the boat, and I kept it alive one day. It was apparently unable to fly when first seen and was quite thin. I found on skinning it that a single pellet of dust shot had passed through the brain and stopped at the bone on the opposite side. Clots of blood were in the track of the shot through the brain. That a sick bird with a shot through the brain can live several days, shows that it is of low organism or has unusually great vitality. Its actions may not have been normal because of this wound in the brain. Its usual position was lying flat on its belly on the floor. On being stroked on its back, which it seemed to dislike, it rose, with the body at an angle similar to that of a duck walking, took a few steps very awkwardly, and fell flat on the floor again. The middle of the feet in walking were put down about under the outer outline of the body on either side, and the resulting waddle was greater than I have seen in any other species of bird. At each step the feet made a decided pat on the floor. On stroking it several times, it uttered a low, harsh, grating sound similar to what I heard a wounded one utter as I pursued it in the boat. If I teased it some time, it would bite my finger, but its bite was too weak to hurt at all. A few times it rose of its own accord and straightened up and flapped its wings, its body inclined at an angle of 45° or 50°, but at no time did it take the nearly erect position given in most plates of allied species. Probably, had it been unhurt and well, it would have stood more erect. The stomachs of some examined contained shrimps. One day while I was watching

from the boat some sea-lions lying on some rocks off shore, an Auklet swam around me some time, busily fishing for shrimps. For some it simply dipped its head under water, for others it dove a few inches. The fishermen spoke of this and the other small species of Auks and Guillemots as 'Farallones,' not seeming to distinguish between the various small species.—F. STEPHENS, *Witch Creek, Cala.*

Behavior of a Sandhill Crane.—While shooting near Madelia, Minnesota, one autumn day some years ago (Oct. 1 or 2, 1873), my companion, Mr. Horace Thompson of St. Paul, slightly wounded with a rifle ball at long range an immature Sandhill Crane (*Grus mexicana*) which with several others was resting on the prairie. At the report they all flew away except the wounded bird and one other which apparently was its parent. The wounded bird, after a number of unsuccessful attempts to fly (assisting itself by first running, accompanied by the parent which kept beside it), finally succeeded in rising some ten or fifteen feet from the ground, but it evidently could not long sustain itself in the air. The parent bird, perceiving this, deliberately placed itself *underneath* the wounded one, allowing it to rest its feet on her back, both birds flapping away all the while. In this position she actually succeeded in bearing it off before our eyes for quite a distance to a place of safety, where we would not follow it. It was one of the most touching examples of parental affection in a bird that has ever come under my observation.—GEORGE H. MACKAY, *Nantucket, Mass.*

Ionornis martinica in Kansas.—A fine specimen of the Purple Gallinule (*Ionornis martinica*) was captured near Manhattan, Kansas, on April 14, 1893. The bird was killed by a farmer who struck it with a sunflower stalk. It is now in the possession of Dr. C. P. Blachly of this place. This is the first record of the occurrence of the Purple Gallinule in Kansas.—D. E. LANTZ, *Manhattan, Kansas.*

Pseudogryphus californianus.—Mr. Thomas Shooter, a well-known taxidermist of Los Angeles, has in his possession the mounted skin of a California Vulture shot near Rincon, California, about August 13, 1892. The specimen, though over four feet in length, appears to be an immature bird. Down fairly well covers the head and neck, excepting wide tracts below and back of the eyes and on the chin and lower throat. The greater coverts are narrowly bordered with rusty, as are a good many of the feathers on the back. The plumage generally is dull black. The horny part of upper mandible is horn-brown. The cere has dried a dull blackish brown.

About June, 1892, an adult California Vulture was brought to Mr. Shooter alive. It was captured by two men, one named Harris, about twenty-seven miles north of Santa Monica, and in the foothills near the line separating Los Angeles and Ventura Counties. Mr. Shooter says the

men saw this bird on the ground devouring the body of a wildcat which, when frightened away, it carried off in its claws. Shortly afterwards the bird was seen in a tree in the vicinty. A rope snare was rigged in the tree's top, and the bird captured, and brought alive to Mr. Shooter. It seemed at times to be troubled with a kind of asthma; which trouble seemed to increase, for it appeared to be a local complaint. A month later Mr. Shooter's assistant in trying, alone, to move this powerful bird from one cage to another, was severely bitten, and in trying to save a finger from being bitten off, broke the bird's neck. This bird's skin was mounted and is now at the Chicago exhibition.

In or about 1889, a bird of this species was captured near Puente, Los Angeles County, and was brought to Mr. Shooter. It was emaciated and dying when found.

During his thirteen years' residence in Los Angeles, Mr. Shooter remembers having seen but two other California Vultures. He considers them very rare; though recently a hunter has informed him that he knows of the whereabouts of two that keep in the mountains.—R. H. LAWRENCE, *Duarte, Cala.*

Cathartes aura in Chenango County, New York.—In the latter part of the summer of 1891 a Turkey Vulture was shot in the town of McDonough, New York, and was mounted by a young taxidermist of that place. At the time it was killed it was feeding on the carcase of a woodchuck.—HENRY C. HIGGINS, *Cincinnatus, New York.*

Strix pratincola in New York.—A fine female Barn Owl, now in my collection of mounted birds, was shot September 13, 1891, in the town of Pitcher, about three miles from this place.—HENRY C. HIGGINS, *Cincinnatus, New York.*

Short-eared Owl Nesting on Plum Island, New York.—While on a visit to Plum Island, on May 7, 1891, I noticed a Short-eared Owl circling over the beach grass on the southwest plain and, on my approach, showing unmistakable signs of anxiety. With the aid of my setter 'Jack' I soon flushed the female, and discovered the nest, which consisted of a slight hollow in the bare sand in a rather scattering growth of beach grass, with no attempt at concealment. It contained one young bird which, as near as I could judge, was about two weeks old, one rotten egg, and three meadow mice (*Arvicola*), minus their heads.

The old male circled around about fifty yards off, uttering cries which sounded very much like the squealing of young pigs. The female came much closer, and her cries reminded me of the barking of a young puppy. I searched the vicinity for more young, but failed to find any.—W. W. WORTHINGTON, *Shelter Island Heights, New York.*

Xanthocephalus xanthocephalus and Spiza americana in Maine.—A female *Xanthocephalus xanthocephalus* was collected by Mr. Fred. Rackliff, on Metinic Island, Knox Co., Maine, Aug. 17, 1882. The bird was discovered quite early in the forenoon in a piece of oats on the northeast part of the island, where it remained until a little after noon, when it was shot. The island lies about four miles southeast of the mainland of the town of St. George. The capture was effected directly after a 'fog mull' and light rain, but no heavy wind was experienced here. The bird was flushed several times before it was shot, but showed no disposition to leave the place. Mr. Rackliff mounted it for his collection. I believe this is the first instance of the bird's capture in Maine.

A young male *Spiza americana* was taken by Mr. Ralph H. Norton at Westbrook, Cumberland Co., Maine, Oct. 10, 1888. The bird was flushed from the rushes growing by a low field drain, and was in company with several species of Sparrows. The throat mark was indicated by a few black-centred feathers scattered over the upper throat. The skin is now in my collection. So far I have been unable to find any record of its occurrence in Maine.—ARTHUR H. NORTON, *Westbrook, Maine.*

The Ipswich Sparrow (*Ammodramus princeps*) on the coast of Georgia.—Mr. W. W. Worthington has very kindly given me permission to announce the occurrence of this Sparrow in Glynn County, on the coast of Georgia, where he took two specimens in January, 1890,—one on the 8th, the other on the 15th. I have examined both birds, and find them perfectly typical representatives of *A. princeps* which has not been previously recorded, I believe, from any point on the Atlantic Coast south of Cobb's Island, Virginia.—WILLIAM BREWSTER, *Cambridge, Mass.*

A Hybrid Tanager.—While in Omaha last fall for a few hours I called on Mr. Leonard Skow who called my attention to a Tanager in his collection that did not fit the keys. On my return to Washington I arranged to have the bird sent on for examination, and Mr. Ridgway pronounces it an unmistakable case of hybridism between *Pyranga rubra* and *P. erythromelas*—the first known instance of this phenomenon in the genus.

The bird is a male. Its bill is rather thicker than in *P. erythromelas*, but not so long as in *P. rubra*, with the median notch of the upper mandible well developed. The wings are rusty black, the primaries are edged with red on the outer web, while the secondaries and coverts are washed with brick red, giving the whole wing the appearance of having been brushed over with a water color of reddish yellow. The tail is marked in the same manner, but with more of the appearance of having been dipped in the red stain, as the whole web of each feather is tinged more deeply on the outer than on the inner web and at the base than at the tip. The body has the scarlet color of *P. erythromelas*, with no trace of the vermillion of *P. rubra*, though there is a little of the bronze of immaturity on the nape of the neck and on the belly. In a series of about thirty

specimens of *P. erythromelas* there is no trace of the reddish wash on the black—though several show red feathers among the black coverts. The characters of *P. erythromelas* are the stronger on the whole, as might be expected, as it seems the hardier bird of the two.

Measurements show that it is intermediate in size between the two species. I give a few (in inches), with those of Ridgway's 'Manual' for comparison.

	Wing	Tail	Culmen
Hybrid	3.90	2.85	.60
P. rubra	3.55–3.95 (3.69)	2.80–3.15 (2.99)	.82–.90 (.86)
P. erythromelas	3.55–3.90	2.80–3.25	.55–.60

The specimen is now in the collection of the U. S. National Museum —L. M. McCormick, *Washington, D. C.*

The Summer Tanager in Connecticut.— An adult male *Piranga rubra* was taken here April 28, 1893. The weather was quite cold at the time. Although in rather poor flesh, the bird shows no signs of ever having been caged.—Jno. H. Sage, *Portland, Conn.*

Cape May Warbler at Shelter Island, New York.—While collecting birds here on May 11, 1893, I secured a fine male Cape May Warbler. It was leisurely searching for insects in an oak grove on the very highest point on the island, and showed no alarm at my presence. It came in a 'bird wave' consisting of Warblers, Orioles, Chimney Swifts, Bobolinks, and Thrushes, which came on in numbers on that date or during the night previous.—W. W. Worthington, *Shelter Island Heights, New York.*

Nesting Habits of Galeoscoptes carolinensis. —This spring (1893) a pair of Catbirds (*Galeoscoptes carolinensis*) took it upon themselves to build a nest in a small but dense honeysuckle vine that runs over a wire netting under the very roof of the side veranda of my house. Not in the least daunted by either cats, children, or constant passers-by, they had evidently come to stay and rear a brood. It occurred to me that it might be a good opportunity to note the exact times of their egg-laying, and also the precise number of days included within the period of incubation. After the nest had been completed twenty-four hours the female deposited her first egg, and then laid three more, making four in all, upon the hours and days as set forth in the subjoined record.

First egg	laid	May	11,	1893,	at 10.35 A. M.
Second "	"	"	12,	"	" 9.40 A. M.
Third "	"	"	13,	"	" 9.15 A. M.
Fourth "	"	"	14,	"	" 10.15 A. M.

Now what interested me most here was the fact that she not only laid an egg regularly every morning, but that it was also laid at about the same hour. The earliest one deposited was at 9.15 A. M. and the latest at 10.35, a difference of only one hour and twenty minutes. We must observe, too, that eggs one and four, were laid later than eggs two and three.

For the first few days she sat upon them only at irregular intervals, and was often absent an hour or more, but this habit soon changed after that time, when she finally gave them her undivided attention. On May 25 there were no birds hatched at dark, but on the morning of the 26th three young were in the nest, and the fourth egg, yet unhatched. That is, hatching took place during the night of the 25th. The fourth egg was not hatched until the night of the 26th. Here it will be as well to note that the mother sat on the eggs from dark until daylight, and it is fair to presume that egg number one was among those constituting the first three hatched. But if this be so the first egg was fourteen days in hatching; the second (?) but thirteen days, and the third (?) but twelve days. Again presuming that egg number four was not hatched until the night of the 26th, it, too, was but twelve days before the embryo escaped from it. This is taking it for granted that the first three eggs laid were also the first three hatched; I had no means of assuring myself of this, as I feared if I marked the eggs in any way she might abandon them, and this part of the record would be lost altogether.

At 6.45 P. M. on June 5, all the birds left the nest together. No one was near it at the time, and there appeared to be no special disturbing cause. There was threatening weather, to be sure, and low rumbling thunder at the time, but no lightning nor loud reports. We were dining at that hour, and my first knowledge of their having left the nest was my attention being called to a young one near the open dining-room door, which led out on the veranda. All the young were easily made prisoners on the ground, and I consigned them to a comfortable cage, which I hung up under the roof close to the nest. Here the parents faithfully fed them through the cage wires until noon of June 8, at which time any one of them could fly fifty or sixty feet with considerable vigor. Fearing that something might happen to them in the cage, at the time just mentioned I took them all down to the lower end of my garden and let them go in the dense underbrush that was overshadowed by numbers of second growth oaks and other trees. The parents were overjoyed at their escape, and it is my hope that none of them fell prey to the many prowling cats about, two of which I had shot in their attempts to get them the last few days the birds remained in the nest. It is not often that the opportunity offers to make as exact notes of the times of egg-laying of birds as are here presented, and I can but trust that they may be of use to those who in the future may have similar chances to observe, and who may care to compare their observations with those of mine. — R. W. SHUFELDT, *Takoma, D. C.*

Connecticut Notes. — On May 6, 1893, while collecting in a small patch of woods on the outskirts of this city I shot an Audubon's Warbler from a flock of Yellow-rumps. The bird is a male in very high plumage, the yellow throat being conspicuous and the chest pure black. On May 8 I again visited the woods, and after shooting several Yellow-rumps, I procured another Audubon's, this time a female in dull plumage but with the throat very plainly yellow.

On the same day I procured an adult male Lawrence's Warbler, and on May 22 an adult male Brewster's Warbler.

May 31 I noticed a Lawrence's Warbler which I thought was breeding. On June 5 I again noticed the bird and shot it, and, after hunting some time, I finally flushed the female from her nest which, unfortunately,[1] contained six young birds. I had a very good chance to examine her as she was constantly within six or eight feet from me. The nest was in all respects precisely like that of the Blue-winged Warbler. The young birds were well feathered out, and several of them showed traces of black on the throat. — A. H. VERRILL, *New Haven, Conn.*

Correction.—A recent careful re-examination of the contour map of the U. S. Geological Survey discloses that my statement made on pages 41 and 42 or the January 'Auk' as to the elevation of Clearfield County, Pennsylvania, is not wholly correct, since there is a considerable area in the central and northeastern part of the County which is under 1500 feet, and some even below 1000 feet, while the section over 2000 feet in elevation is confined to the southern portion and does not extend into Indiana County as was originally stated.—W. E. CLYDE TODD, *Washington, D. C.*

The Faunal Position of Lower California.—In the last number of 'The Auk' Dr. J. A. Allen, writing of the faunal divisions of North America, quotes me as giving the peninsula of Lower California the rank of a 'subregion'—whatever that may mean. His exact words are: "The Sonoran Subprovince consists of Dr. Merriam's restricted 'Sonoran subregion,' with the addition of Lower California, which Dr. Merriam gave the rank of a 'subregion.'" (Auk, Vol. X, April 1893, p. 138). This statement is hard to understand in view of the circumstance that I took pains to point out, a year before the appearance of Dr. Allen's article, that Lower California was not entitled to the rank usually accorded it in faunal papers,[2] but should stand only as "a minor subdivision of the Lower Sonoran Zone." In this paper, which is several times quoted by Dr. Allen, I summed up the faunal results of a study of the mammals, birds, reptiles, and plants of the

[1] The really unfortunate part of the affair seems to have been not that the writer was disappointed in his hopes of a set of eggs, but that he failed to capture and rear the young and to secure the female, — that he threw away a rare opportunity of casting much light on the status of this doubtful species. — EDS.

[2] The way Lower California has been treated by writers on distribution I have summarized in Proc. Biol. Soc. of Washington, VII, April 1892, pp. 16–17.

peninsula, and stated: "The peninsula of Lower California is a subdivision of the arid Lower Sonoran Zone. Not a single genus of land mammal or bird is restricted to it, and but two peculiar species of mammals have been described. The peculiar birds are more numerous, but with few exceptions are only subspecifically separable from those of neighboring parts of the United States and Mexico . . . . Among reptiles, about 25 peculiar species of snakes and lizards are believed to be restricted to the peninsula, but no peculiar genus is known. Three of the genera are tropical, and nine are arid Lower Sonoran. In addition to the peculiar species and subspecies of the peninsula, many characteristic arid Lower Sonoran forms of mammals, birds, reptiles, insects, and plants abound. Among the latter may be mentioned the highly distinctive Sonoran desert brush, *Larrea mexicana* and *Krameria parvifolia* . . . . It is evident, however, that the peculiar fauna of the peninsula of Lower California entitles it to rank as a minor subdivision of the Lower Sonoran Zone. It is in effect an insular fauna of recent origin, bearing the same relation to that of the mainland as do several of the adjacent islands." (Presidential Address on the Geographic Distribution of Life in North America, Proc. Biol. Soc. Washington, Vol. VII, April 1892, pp. 29–30).

The case is simply this: Dr. Allen has quoted views expressed by me several years ago, before I had made a special study of the faunal position of Lower California, instead of my later views on the same subject, Parallel instances of the quotation of earlier instead of later conclusions occur in other places. — C. HART MERRIAM, *Washington, D. C.*

[I trust it is needless for me to say that the misrepresentation implied above by Dr. Merriam was entirely unintentional and unconscious on my part. Accompanying the quotation given by Dr. Merriam is a footnote (not mentioned by him), as follows: "N. Am. Fauna, No. 3, 1890, p. 25, and map 5." This refers to a paragraph which begins as follows: "The *Sonoran Province*. . . . comes into the United States from the south and is divisible into six subregions, namely: (1) an *Arid* or *Sonoran* subregion proper, occupying the tableland of Mexico and reaching north into western Texas, New Mexico, Arizona, and southern California; (2) a *Californian* subregion, occupying the greater part of the State of that name; (3) a *Lower Californian* subregion; (4) a *Great Basin* subregion . . ."; and so on. Now as to "'subregion'—whatever that may mean";—on this apparently there can be no better authority than Dr. Merriam himself. I used it, in the passage in question, as a borrowed term, and to indicate this placed it between 'single quotes.' 'Subregion', as here used, is employed of course in a very different sense from 'subregion' as used by me in a technical sense. And Dr. Merriam, as I understand it, merely employed it in a *quasi*-technical sense to designate provisionally subdivisions of a minor grade.

In his later paper ('Presidential Address') Dr. Merriam says: "The Sonoran Region may be divided by temperature into two principal trans-

continental zones, (*a*) *Upper Sonoran*, and (*b*) *Lower Sonoran;* and each of these in turn may be subdivided into *arid* and *humid* divisions" (l. c., p. 27). Nothing is said here or elsewhere, so far as I have been able to discover, about 'subregions,' nor is there any definite allusion to the divisions of the 'Sonoran' previously announced, nor any definite clue given as to what extent that classification was intended to be abrogated or modified by the later paper. In fact, the later paper does not perhaps go sufficiently into details to make this distinctly requisite. At page 29 of the 'Address,' however, it is stated that "Lower California is a subdivision of the arid Lower Sonoran Zone"; and on page 30 that Lower California is entitled "to rank as a minor subdivision of the Lower Sonoran Zone." And this is all that I supposed was implied by the classification given in the previous paper (N. Am. Fauna, No. 3, p. 25).

My purpose in referring to and making use of Dr. Merriam's 'subregions' in defining my own areas was two-fold: *first* (as they had been already mapped and defined), to save trouble and space in writing out their boundaries; *second*, in order to make a direct comparison between them and my own, which for the most part merely differed in respect to nomenclature. In connection with the statistics given by me respecting the bird fauna of Lower California, I should have given, or at least made reference to, the much fuller statistics previously published by Dr. Merriam respecting the fauna and flora in general; the omission to do this was purely an oversight (partly due, however, to the necessity for condensation), which I sincerely regret, and I am glad to have Dr. Merriam give them their merited prominence in the present connection.

As Dr. Merriam has shown in his admirable historical summary of the treatment of Lower California by previous writers (Pres. Add., pp. 16, 17), many authors who have referred to it have recognized its low ratio of peculiar forms and its close relationship to the arid interior district designated by Dr. Merriam as 'Arid Lower Sonoran.'—J. A. ALLEN.]

NOTES AND NEWS.

MR. JENNESS RICHARDSON, an Associate Member of the A. O. U., died at Bryn Mawr Park, Yonkers, N. Y., June 24, 1893, at the age of 36 years and 19 days, after a long and painful illness. Although Mr. Richardson has published little, he was an excellent field naturalist and collector, but was especially distinguished as one of the leading taxidermists of the modern school. He was born at Rutland, Vt., in 1857, where he spent his younger days, early developing a strong taste for natural history pursuits, and unusual skill as a taxidermist. He was for some years an assistant of Mr. W. T. Hornaday at the National Museum in Washington. In 1886 he left Washington for New York, and took the position of Chief

Taxidermist at the American Museum of Natural History. He built up and was at the head of the very efficient Department of Taxidermy at this institution until serious ill health compelled his retirement a few months since. The many fine pieces of taxidermy which he has superintended or personally executed, including some sixty groups of birds and mammals, will long remain a monument to his memory. His most noteworthy pieces are the Bison Group (18 x 30 feet), a Woodchuck Group, a Muskrat Group and an Opossum Group among mammals, and of the 54 bird groups perhaps the most striking and attractive are the Robin, Louisiana Waterthrush, Cliff Swallow, Mottled Owl, Ruffed Grouse, Florida Blue Heron, Wood Duck (see Auk, Vol. X, pl. ii), the Labrador Duck and the Laughing Gull. His groups were not only original and artistic in design, but were executed with the utmost care as to details, and mark an era in the history of taxidermy and in museum exhibits, at least for America, being anticipated in point of time only by the exhibits at the South Kensington Museum in England. They are probably unexcelled in realistic effect.

Mr. Richardson was a man of great energy, of high ambition, and amiable traits of character, and his death will prove not only a severe loss to his many friends, but to the art to which he was so enthusiastically devoted.

As announced in the last number of 'The Auk', the unveiling of the monument to the naturalist John James Audubon occured on the afternoon of April 20, with appropriate addresses by Prof. Thomas Egleston, in behalf of the New York Academy of Sciences and the Rev. Dr. Morgan Dix, in behalf of the Trinity Cemetery Corporation. In the evening at a commemorative meeting, held in the lecture hall of the American Museum of Natural History, an address on the life and scientific work of Audubon was delivered before a large audience by Mr. D. G. Elliot. A detailed account of the proceedings, together with a general history of the enterprise, will be shortly published in the 'Transactions' of the New York Academy of Sciences, including the addresses in full.

The first part of Prof. Alfred Newton's 'Dictionary of Birds,' long since announced as in preparation, has just appeared, forming an octavo volume of over 300 pages, with numerous illustrations. It is based upon the articles contributed by him to the ninth edition of the 'Encyclopædia Britannica,' but contains besides a large number of others by himself and Dr. Hans Gadow, together with contributions by Mr. R. Lydekker, Professor Roy and Dr. Shufeldt. The work is to consist of four parts, and when completed will form a demy 8vo volume of about 1000 pages, copiously illustrated. The Publishers, Messrs. Adam and Charles Black, promise Part II in October.

Mr Frank M. Chapman, of the American Museum of Natural History, New York City, recently returned from his trip to the Island of Trinidad, bringing with him a large collection of birds and mammals, his trip having proved eminently successful and satisfactory. The scientific results will soon be published in the 'Bulletin' of the Museum.

Lith. by Kenderdine, Phila.

BOBOLINK (DOLICHONYX ORYZIVORUS).

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ON THE CHANGES OF PLUMAGE IN THE BOBOLINK (*DOLICHONYX ORYZIVORUS*).

BY FRANK M. CHAPMAN.

In a previous number of 'The Auk,'[1] I described, under the above title, the changes which occur in the plumage of the Bobolink, with particular reference to the manner in which the breeding plumage of the male is acquired. This latter point was one on which considerable difference of opinion existed, but the question seemed to be settled by a specimen in the American Museum of Natural History (No. 32,783, H. H. Smith, Corumbà, Matto Grosso, Brazil, March 1, 1886) which showed clearly the character of the spring change of plumage.

This specimen is apparently unique and exhibits in a remarkable degree the extent of a change in color which, in a comparatively short time, occurs solely through fading and a wearing away of the exposed tips of many of the feathers.

When compared with a specimen in which, through these causes, the 'full' or black plumage has been acquired the differences are so great that it is difficult to believe they can have occurred without an actual moult. For this reason the Editors of 'The Auk' have decided to figure the Corumbà specimen and

[1] Vol. VII, 1890, pp. 120–124.

with it a bird taken later in the season (Am. Mus. No. 36,182, Rutland, Vt., Jenness Richardson, June 4, 1889) in order that the two may be readily compared. At their request I repeat here as briefly as possible the substance of my former paper.

In the course of one year the male Bobolink passes through the following phases of plumage: Late in July or early in August when the breeding season is over, the black male, similar to the figure in the background of the accompanying plate, undergoes a complete moult and appears in the yellowish, Sparrow-like plumage of the Reed-bird, which closely resembles the plumage of the breeding female. In this costume the birds migrate southward, pausing *en route* to visit the rice-fields of the South, and apparently continuing their journey to the campo districts of southwestern Brazil.

The Corumbà specimen shows that the spring change of plumage occurs by March 1. As before stated considerable difference of opinion existed as to the nature of this change, but it was generally believed that the yellowish Reed-bird became the black Bobolink not by moulting but by a change in the color of the feathers. That is, the black area which is present at the base of some contour feathers was supposed to gradually increase in size, while at the same time the tips of the feathers became worn away. As for the buffy nuchal patch and whitish scapulars and rump, I do not know that the manner of their acquisition had ever been explained until the Corumbà specimen was described.

This specimen shows that in the spring as well as after the breeding season a complete moult takes place. As a result of this moult the bird gains a plumage very similar to that shown by the figure in the foreground of the plate.

The Smith specimen is not quite so far advanced as this figure shows; the centre of the belly, the first primary and several of the secondaries in both wings belong to the old, or Reed-bird plumage, while the tail is but one third grown. In drawing this bird Mr. Thompson completed the moult of the wings and tail but did not equally alter the centre of the belly, which should be of the same color as the breast.

The change which follows is one that occurs in many birds, but in none with which I am familiar is it so marked as in the Bobolink. There is a series of birds in the American Museum which

connects the two birds figured by a finely graduated series of intermediates. These show how, as the birds travel northward, the yellow tips of the feathers slowly drop off, and that where they receive the most protection, as for example on the lower belly and crissum, they persist the longest. At the same time the nape, scapulars and rump are fading and the bill and feet are changing respectively from flesh color to blue-black and brownish black.

In a large series of spring males I have seen none taken before June which did not show remains of the yellow fringe; indeed it is exceptional to find specimens which do not show at least a trace of it.

Birds taken during summer represent the extreme of faded and abraded plumage, and Mr. Ridgway writes me, that in his opinion the western race, *D. o. albinucha*, is based on examples in this condition. He futher says, that at the time *albinucha* was described, seasonal counterparts of the specimens on which the race was based did not exist in the National Museum series of Eastern birds. Thus, the specimen now figured from Rutland, although taken as early as June 4, has the nape slightly paler than a male from Pembina, N. D., taken June 14. Again, a male (Am. Mus. No. 57,792) taken at Bluff City, Utah, May 19, has the nape fully as dark as Eastern specimens taken at the same time.

I believe, therefore, with Mr. Ridgway, that the bird known as *Dolichonyx oryzivorus albinucha* should be considered a synonym of *D. oryzivorus*.

THE FOOD OF HUMMINGBIRDS.

BY FREDERIC A. LUCAS.

IN 'Science' for October 28, 1892, was an article by Dr. Morris Gibbs of Kalamazoo, Mich., entitled 'The Hummingbird's Food,' in which the author stated as the result of his observations, and

the dissection of many specimens of *Trochilus colubris*, both young and old, that he had never found anything to convince him that they lived on insects.

Dr. Gibbs' paper was followed by notes from Mr. Lawrence Bruner, saying that he had observed the Rubythroat taking sap from *Quercus ruber*, and Mr. Frank Bolles, stating that he had seen the same species regularly attending at holes drilled by the Sapsucker (*Sphyrapicus varius*) in red maple, red oak, poplar, white and gray birch, and white ash. Later on Mr. W. N. Clute wrote that in southern New York the favorite flower of the Rubythroat is the swamp thistle (*Cirsium muticum*), and as the honey bee gets pollen, but no honey, from this flower, it would appear that birds visit these flowers for the sake of the insects they contain. Many of these insects were said to be so minute as to escape ordinary observation; and were these taken and larger species left, the impression might be produced that no insects had been eaten. Lastly Mr. Alvah A. Eaton wrote that in California Anna's Hummingbird fed on the sap of the willow (*Salix lariolepis*), drinking at holes made by *Sphyrapicus ruber*, and from wounds made by the grub of a large borer. I have also been told that the Rubythroat has been seen in fall hovering about fallen pears from which the juice had exuded sufficiently to attract numerous 'yellow-jackets.'

In view of the published accounts of Gould, Gosse and others, substantiated by incidental observations of my own, this amount of testimony to the vegetable nature of the Hummingbird's food was a little surprising, and, in the hope of throwing a little light on the subject, the birds themselves were appealed to and the stomach contents of a number examined.

Altogether twenty-nine specimens, representing thirteen species, from sixteen widely separated localities, were examined, and all of these, save four which were quite empty, contained insect remains, usually in large quantities. Young Hummingbirds examined by Dr. Shufeldt and myself contained flies, spiders, and beetles, and any one who examines a nestling will notice that the skin of the neck is distended by the expansion of the œsophagus where this is, or has been, packed with food, so it is pretty safe to say that it is more than doubtful that honey enters into the little ones' bill of fare.

Mr. William Palmer tells me that he has seen the Rubythroat picking small spiders from their webs, and Professor Beal says that he has seen a Hummingbird stealing flies from a spider's web.

It would seem to be safe to assume that the main food of Hummingbirds is small insects, mainly diptera and hymenoptera. Homoptera are usually present, and small spiders form an important article of food, while hemiptera and coleoptera are now and then found. The small size of the insects may be inferred from the fact that one stomach contained remains of not less than fifty individuals, probably more.

Most of the insects found occur in or about flowers, and my own views agree with those of Mr. Clute, that it is usually insects, and not honey, that attract Hummingbirds to flowers, while in support of this is Mr. Palmer's testimony, he having examined blossoms of the trumpet vine and found that those visited by Hummingbirds contained few or no small insects, while the unvisited flowers contained many.

In view, however, of the testimony cited at the beginning of this paper, it would seem unquestionable that Hummingbirds do to some extent feed on the nectar of flowers and the sap of trees. That the Rubythroat in particular is addicted to this food is apparently indicated by the fact that three out of the four totally empty stomachs found were from this species, as well as a large proportion of the partly full stomachs. On the other hand, the three empty [illegible] Matamoras, and some [illegible] their condition. It is also [illegible] seems [illegible] Hummingbird [illegible] Dr. Gibbs and the [illegible] the [illegible] without [illegible] examined [illegible]

The [illegible] Hummingbird [illegible] not [illegible] curious [illegible] will [illegible]

[illegible] Hummingbird [illegible] has [illegible]

Below is a list of the material examined, and I may say in addition that in preparing skeletons of Hummingbirds I have examined a number of specimens, not noted, all of which contained remains of insects. The greater part of these specimens were in the collection of the U. S. National Museum, but most of the examples of *Trochilus colubris* were among the material collected for the Division of Ornithology and Mammalogy, Dept. of Agriculture, and I am indebted to Dr. C. Hart Merriam for the privilege of examining these. I am also indebted to Mr. W. H. Ashmead for kindly determining such of the insects as have been identified.

Lampornis dominicus.—Jeremie, Hayti. Stuffed.

Eulampis chlorolæmus.— *a*. Barbadoes, W. I. Stuffed. Fragments of *Eurytoma*, *Chalcis*, *Cecidomyia*, *Typhlocyba*, *Jassus*.

Eulampis chlorolæmus.— *b*. Barbadoes, W. I. Stuffed with remains of diptera, etc. Eggs of insects? One entire beetle and part of a second, belonging to the genus *Hypothenemus*, of interest as being a bark borer.

Florisuga mellivora.—Nicaragua. Stuffed with fragments of insects.

Trochilus colubris.— ————? Full.

Trochilus colubris.—Washington, D. C., Aug. 8. Fragments of insects.

Trochilus colubris.—Todmorden, Ontario, Aug. 15. Six specimens of gnats, three of *Entedon*, two species *Bythoscopus*.

Trochilus colubris.—Todmorden, Ontario, Aug. 22. Four young tomisoid spiders.

Trochilus colubris.—St. Catherine's, Ontario. A few fragments of insects.

Trochilus colubris.—Montgomery Co., Pa., Aug. 25. A few fragments.

Trochilus colubris.—Hawkinsville, Fla. Many minute fragments of insects.

Trochilus colubris.—Matamoras, Mexico. Three specimens, all empty.

Trochilus colubris.—Washington, D. C., May 10. Many fragments of spiders. A few rounded grains of sand.

Trochilus colubris.—Washington, D. C., May 10. Fragments of diptera, etc. Two spiders.

Trochilus alexandri.—Fort Wingate, N. M. Two specimens, one full, the other partly full, of insect remains. One specimen had swallowed a splinter of wood a quarter of an inch long.

Calypte costæ.—Cape St. Lucas, Lower Cala. Full of insects and spiders. *Phora*, *Telenomus*, *Polygnotus*, *Typhlocyba*.

Stellula calliope.—Fort Wingate, N. M., July 3. Two specimens. One full of insect fragments, principally diptera and hymenoptera. The second partly full of fragments, including one beetle.

Selasphorus platycercus.—Apache City, Arizona, August. Full of fragments of insects.

Selasphorus rufus.—Apache City, Arizona, Aug. 23. Full of insect remains.

Selasphorus rufus.—Fort Huachuca, N. M. Two specimens, both partly full of insects.

Doricha evelynæ.—Ruin Cay, W. I. Full of insect remains.

Basilinna xantusi.—Cape St. Lucas, Lower Cala. Stuffed. *Cecidomyia*, *Phora*, three specimens of *Solenopsis geminatus*, elytra of beetle, *Psyllus*, parts of spiders.

Iache latirostris.—Morelos, Mexico. Partly full.

Chlorostilbon sp. ?—Empty.

ORNITHOLOGY AT THE WORLD'S FAIR.

BY FRANK M. CHAPMAN.

WHILE the zoölogical sciences were assigned no especial place at the World's Fair in Chicago several branches are nevertheless well represented.

The larger mammals receive, in proportion to the number of species, the most attention, the exhibits ranging in size and importance from the finely mounted collections shown by the National Museum and the State of Kansas to the moth-eaten, undressed skins tacked on the wall of some exhibitor's section.

The Fish Commission of course presents an excellent economic display of piscatorial products, and the economics of entomology are well represented by the U. S. Department of Agriculture and the Illinois State Laboratory. Reptiles are exhibited in small numbers by the U. S. National Museum, while the same institution and Ward's Natural Science Establishment have exhibits of invertebrates.

In point of number of specimens probably birds are better represented than any other branch of the animal kingdom. The lack, however, of a section devoted to zoölogy makes it exceedingly difficult to learn the location of a given exhibit even after one has ascertained its existence. Thus collections of birds are displayed in many of the State and foreign build-

ings, and in the vast structures devoted to manufactures and liberal arts agriculture, ethnology, and the exhibits of the United States government.

These collections, using this word in a broad sense, may be classed under three heads: artistic or taxidermic, commercial, and scientific. The first includes exhibits by taxidermists, of which panels of game-birds shown by F. H. Lattin & Co. are probably the best. The second contains such purely commercial exhibits as eiderdown robes from Norway, and feather work from various Central and South American Republics. Here also might be placed a collection of characteristic Bogota skins shown in the building of the United States of Colombia. Other exhibits in both the preceding classes may be passed over. The third class, scientific exhibits, may be divided into four groups, Foreign, United States and Canada, General, and Government.

Foreign Exhibits.—Outside of America there are apparently only two exhibits of foreign birds.

New South Wales, prominent in almost every department of the Fair, has a small case of water birds in the Fisheries Building, and in the Manufactures and Liberal Arts Building a general collection, mounted on the branches of two trees. These birds were without labels. Japan has a small collection of mounted birds, labelled with both scientific and common names.

Of the Central and South American Republics the collection shown by Costa Rica in its own building is incomparably the best. It consists of several hundred well mounted birds bearing labels of the same character as those used by the Smithsonian Institution. The cases are excellent but the birds are rather carelessly arranged and a number of the labels were transposed. In addition to this systematic exhibit Costa Rica devotes one end of the gallery of the building to a somewhat theatric display of characteristic birds, mammals, and reptiles, with presumably natural surroundings, and a large, painted background.

One room of Guatemala's building is given to a grotto from whose crevices peer truly grotesque mammals, while stuffed birds, a part of which are labelled, are wired to the branches of neighboring trees.

Cuba has a small mounted collection of characteristic birds. Trinidad shows a mounted group of bright-colored birds, some

of which are obviously from the mainland. British Guiana has the best local exhibit of foreign mammals, but its exhibit of birds is limited to a few skins of the brighter species.

At the time of my visit several foreign departments were as yet unopened and I cannot, therefore, say whether they contained collections of birds.

United States and Canada Exhibits. — The exhibits under this head include local collections representing the avifauna of a State or Province. As a rule they are official, that is, made by authority of the State.

In this department Illinois is easily leader. Its collection, placed in the State Building, is well-mounted and the method of arrangement is one which might well be followed in the display of similar collections. As a rule a pair of each species is shown under each of the following groups: 'Common Game Birds'; 'Summer Residents throughout Illinois'; 'Winter Residents throughout Illinois'; 'Stragglers in Illinois'; 'Migrants passing through Illinois'; 'Winter Residents of Southern Illinois'; 'Summer Residents of Southern Illinois'; and similar groups from the northern part of the State. There are also excellent groups, with natural surroundings, of Wild Turkeys, Green Herons, Prairie Hens and Red Crossbills, and, in addition, a collection of the eggs of Illinois birds.

At the conclusion of the Fair this collection, nearly all of which was mounted within the brief space of eighteen months, will be removed to the Museum of the University of Illinois. It will there prove a lasting monument to the energy and ability of its preparator, the late Mr. C. F. Adams, whose death, due to overwork, occurred while he was arranging it in Chicago.

Ohio has a well-arranged collection of State birds; North Carolina and Minnesota collections of game birds.

Pennsylvania is represented by a section of the State, giving brooks, ravines, mountains, etc., with the birds and mammals of the State placed with their natural surroundings. The object of exhibits of this kind is, of course, to give at a glance an idea of the fauna of the State, but, as in the present case, the result is apt to be confusing rather than instructive. It would seem better in preparing groups of this kind not to attempt to bring all the birds and mammals of the State into a comparatively small space,

and thus, in what purports to be a natural scene, avoid producing many unnatural effects. If, instead of this, smaller groups were shown, as for example a marsh and pond with characteristic marsh, shore and water birds, a field and roadside with its Finches, etc., would they not convey a truer impression of the avifauna to the mind of the uninitiated?

The Manitoban exhibit is placed in the Manitoba building outside the Fair grounds. It contains a large number of birds mounted on trees, but without labels.

Ontario displays a smaller collection in the Ethnological building.

General Exhibits.—The natural history collections shown in the Ethnological building by Ward's Natural Science Establishment contain representatives of almost every branch of the animal kingdom, and as a whole the exhibit is the most extensive of its kind at the Fair. The collection of birds numbers several hundred specimens and includes representatives of most of the families of the class.

Under the decidedly non-committal label of "Specimens of Birds either Beneficial or Injurious to the Farmer," Brown University exhibits a smaller collection of our commoner species.

United States Government Exhibits.—The collections of birds displayed by the Government include a systematic and popular exhibit by the United States National Museum and an Economic exhibit by the Division of Economic Ornithology and Mammalogy of the Department of Agriculture.

The first is composed of the following collections and groups:

(1) A systematic collection of the leading representatives of the families of American birds with family labels, giving a general account of the range and relationships of each family, and species labels, giving the habitat of each species shown. (2) A beautifully mounted collection of the principal game-birds of the world, including most of the North American species. (3) A case of birds whose names are frequently confused as, for example, the American and English Robins, Pheasants, Partridges, Quails, etc. (4) A case of about one hundred and fifty Hummingbirds. (5) A case of some fifty Birds of Paradise. (6) A group of Domestic Fowls. (7) A dovecote with twenty-four varieties of Domestic Pigeons perched upon it. There are also excellently mounted

and designed groups, with natural surroundings, of the English Song Thrush, with a nest and young birds; Butcher Birds, with a field mouse and Dickcissel impaled on thorns; Bower-Birds, with their strangely decorated playhouse; and Ivory-billed Woodpeckers at the entrance to their nest. There are two groups of Carolina Paroquets, one showing the birds on a frosty morning feeding on their favorite 'cockle-burrs,' the other showing the interior of a hollow tree with roosting birds clinging to the side, supporting themselves by the aid of bill, feet and tail. A group of Prairie Hens represents these birds engaged in the singular 'prairie minuet,' while two groups of Ptarmigans give a fine illustration of protective coloration. In the first the birds are in the brown or summer plumage, with surroundings to correspond; in the second they are in the white or winter plumage, with snowy surroundings.

A group of Wild Turkeys occupies a space about thirty-five feet in length and shows the method of capturing these birds by means of the 'Turkey pen.' Two Flamingoes, with their truncate mud nests, constitute a unique group, while Jacanas walking over floating lily-pads show the use of their long toes. A group of nine Wild Pigeons feeding on acorns completes an exhibit which is a credit alike to those who planned and executed it. The birds are exceptionally well-mounted and the exhibit as a whole represents our best efforts in avian taxidermy.

The collection was unfortunately somewhat too crowded to show to proper advantage, and Mr. Ridgway writes me that owing to inadequacy of space he was compelled to re-pack at least one third of the collection sent to the Fair for exhibition.

As a graphic lesson in the relations of birds to man, the exhibit of the Division of Economic Ornithology and Mammalogy has probably never been equalled. Here are groups which tell their own story so plainly that the most casual observer, attracted at first by their beauty, cannot leave them without at least some knowledge of the facts they are designed to explain.

The exhibit is of two kinds, one strictly economic, the other faunal. The first illustrates the food of birds, the second their geographical distribution. The following groups of birds with natural surroundings are included in the first class: A Robin worm-hunting on a bit of lawn, attended by its ever-present

persecutor, the House Sparrow; Cedarbirds feeding on elm beetles; House Sparrows destroying peach blossoms; Bobolinks in their summer dress, and also as Reed-birds in the rice-fields in the fall; Purple Grackles taking grubs from a lawn; Crows in a field of freshly sprouted corn; Kingbirds devouring bees; and Cuckoos feeding on tussock moths.

With each group is a map showing the habitat of the species it accompanies, and a label which explains the economic relations of the bird to man.

There are also mounted specimens of Hawks and Owls and, in desk-cases, skins and colored plates of these birds, surrounded by samples of their food, as mammals, birds, insects, etc., and labels giving the results of the examination of the contents of many stomachs. The Crow is treated in the same manner, and the numerous objects displayed form a striking synopsis of the food of this omnivorous bird.

As explanatory of the manner in which birds may be induced to live near the habitation of man, models of bird-houses occupied by our more familiar birds are shown, and suggestions for encouraging the domesticity of birds are given.

The faunal exhibit of this Division contains twenty-eight large maps showing in detail the distribution of as many species, genera, or sub-genera, a relief map showing the life-zones of North America as they are defined by Dr. Merriam, and a model showing part of the Great Basin slope of the Sierra Nevada opposite Owens Lake, southern California, with the characteristic birds and mammals of the region. This model is intended especially to show the effect of climate on the distribution of life, and is so effectively arranged that it explains itself at a glance. In the foreground, at the base of the mountain, is the arid desert region of the Lower Sonoran zone, with such characteristic species as *Amphispiza bilineata*, *Geococcyx*, *Harporhynchus lecontei*, *Campylorhynchus*, and *Callipepla gambeli*. Passing upward into the sage-brush of the foothills, the Upper Sonoran zone is reached. As representative birds of this zone *Oroscoptes*, *Spizella breweri*, *Melanerpes f. bairdi*, *Chondestes*, and *Aphelocoma woodhousei* are shown. Still ascending, one comes to the Boreal zone with its conifers and, as distinctive species, *Cyanocitta s. frontalis*, *Sialia arctica*, *Picicorvus*, and

Cinclus. This zone reaches the limit of trees, beyond which, and including the snow-capped summits, is the Arctic-Alpine zone with *Leucosticte* as a representative bird.

This group is a large one and includes among mammals the jumping rats of the desert, ground squirrels of the mountains, and the woodchuck and mountain sheep of the higher altitudes. From a scientific standpoint it is doubtless the best single exhibit in zoölogy shown at the Fair.

It is quite probable that in this brief review more than one collection of birds has been overlooked. Two hundred and nine acres covered with exhibits proved as difficult 'collecting ground' as the mazes of a tropical forest, and afforded birds quite as excellent opportunities for concealment.

THE HUDSONIAN CHICKADEE AND ITS ALLIES, WITH REMARKS ON THE GEOGRAPHIC DISTRIBUTION OF BIRD RACES IN BOREAL AMERICA.

BY SAMUEL N. RHOADS.

WHILE examining the series of *Parus hudsonicus* at the Smithsonian Institution to determine the status of *Parus hudsonicus columbianus*, Mr. Ridgway suggested to me the desirability of a careful study of the affinities of the several members of this group described by authors. A request for specimens was made in my description of the British Columbian form of *hudsonicus* in 'The Auk' for January, 1893. No answers to this appeal were received, and after a lapse of two months I started a correspondence with several of the most prominent collectors for the loan of skins. From five of these I received, in all, twenty-five specimens, Mr. Brewster sending seventeen, Prof. J. Macoun two, Mr. K. C. McIlwraith four, Mr. A. G. Kingston one, and the Natural History Society of Toronto one. Several of my Canadian correspondents, from whom I had

expected substantial aid, had not seen the bird in life and their testimony develops the rather unexpected fact that this Chickadee is a rare visitor in Manitoba, Ontario and Quebec, and for that matter, in any non-mountainous locality south of Hudson's Bay.

The total result of my search for skins is a suite of eighty-one specimens, the collections of the Smithsonian Institution, the American Museum of Natural History, and the Academy of Natural Sciences supplying fifty-six, and private individuals twenty-five of these. To the gentlemen who have done me service in this connection I would here again express my sincere thanks.

The great extent of the habitat of *Parus hudsonicus* and the fact that three subspecies and one species, of slight differentiation from the type form, from Alaska, British Columbia and Nova Scotia, have been described by authors, make it imperative that a complete study series should contain many times the number I have collected, and come from many times the number of localities represented. Were it probable that any considerable additions of this kind would be made in the next decade it would be advisable to postpone this paper, but the regions from which specimens are most needed give no promise in this direction. There is, however, enough evidence in the present series to throw considerable light on points in question, and the value of such testimony, incomplete and circumstantial as much of it is, is too great to be thrown away and may justify some risks taken on the theoretical side. Undoubtedly there are many specimens of this bird in America which are yet available, and it is hoped that anyone having such will forward them to the Academy of Natural Sciences at an early date in order that they may be examined, with the original series, at the next meeting of the A. O. U. Committee on Nomenclature.

The Hudsonian Chickadee, *Parus hudsonicus*, was first described by J. R. Forster in the Transactions of the London Philosophical Society for 1772. His description was based on specimens sent him from the Hudson's Bay post at Fort Severn, on the southwest coast of Hudson's Bay, at the mouth of the Severn River. Since that time three races of *Parus hudsonicus* and one closely related species, now classed by the A. O. U. as a subspecies, have been described.

In 1863, Dr. Henry Bryant secured a family of Chickadees at Yarmouth, Nova Scotia, and gave a description of them in the ninth volume of the Proceedings of the Boston Society of Natural History under the name "*Parus hudsonicus*, var. *littoralis*." Dr. Bryant comments on certain differences of size and color between his Yarmouth birds and those from Hudson's Bay, as follows: "The specimens of *Parus hudsonicus* from Yarmouth and those from the Hudson's Bay Territory present as great, if not greater, differences in size than exist between *P. carolinensis* and *P. atricapillus*, and in color between *P. septentrionalis* and *P. atricapillus*." As Dr. Bryant goes into no definite comparisons of the two forms, we must conclude that he considered the Yarmouth birds smaller and darker than those from Fort Severn.

This brings us face to face with the important question as to what are the exact characters of typical *hudsonicus*. We have Forster's original Latin description, which is quite detailed. From it we can adduce only one or two decisive facts. One of these is the measurements; but even these are open to some doubt, owing to the different methods of measurement adopted by naturalists. We are, however, convinced that Bryant's measurements were taken from smaller birds than those of Forster. But these differences are no greater than those I have detected between individuals of a series of over twenty from Campbellton, New Brunswick, all secured in April and May of the same year. When we turn to color definitions to solve the difficulty it only increases our bewilderment. The best we can make out of Forster's description is that the top of the head in *hudsonicus* is "reddish brown"; in another place it is "ferruginous brown"; the back is said to be "ashy green, brownish on longest feathers" and the "ends of the feathers somewhat olivaceous brownish green." Comparing this with *littoralis* whose crown and hind neck are said to be "faded, yellowish ash, with back, scapulars and rump dirty ash" there is only one thing certain,— a belief in Dr. Bryant's mind that *littoralis* was lighter colored than *hudsonicus*. But Bryant's description was taken from a pair of birds which had raised a brood and were in the worn and faded plumage of midsummer. I happen to have three such birds from Steiwacke, Nova Scotia, which well answer Bryant's description but are

worthless for comparisons of the kind under consideration, being not only two or three shades lighter than spring and winter specimens from the same regions but having actually lost two to four millimeters from tips of wings and tail by abrasion. So far as descriptions go we have no proof that Forster's bird is any redder, browner, or darker than average *hudsonicus* from Nova Scotia and New Brunswick, the type region of *littoralis;* and the abraded condition of Bryant's specimens can fully account for the difference in recorded measurements.

A more direct way out of this difficulty would seem to be the comparison of recent skins of each form from their respective habitats. Strictly speaking this has been impossible, for my series includes no skins from nearer the type locality of *hudsonicus* than Moose Factory, four hundred miles southwest of it on the shore of James' Bay. This specimen in size and color is comparable to larger skins from Canada East, and the New England States. As will be hereafter pointed out, the Severn River lies near, but within the northern boundary of the Hudsonian Fauna of the Cold Temperate Sub-region[1] within the eastern limits of which the climatic conditions are presumably quite uniform. West of this a race of *hudsonicus* prevails, distinctly separable from Forster's type on account of its larger size. In northern Labrador a humid-arctic environment has produced a race, which I have here described as new, under the name *ungava* (see below, p. 328), differing in size from largest *hudsonicus* from the southeast and showing marked color characters to distinguish it. So far as we can conjecture from Forster's description, his types approach the Labrador form in the so-called "reddish brown" of the crown, but even this is straining a point in favor of their identity with *ungava* as against their closer affinities with Bryant's *littoralis*.

In the absence of specimens from the west shore of Hudson's Bay the weight of evidence is in favor of assuming that the *P. hudsonicus* of Forster represents the northern extreme of what I have defined as the Hudson-Canadian type and not the southern extreme of the Barren Ground race.

Littoralis has not been recognized by the A. O. U., and is ignored by Mr. Ridgway in his 'Manual.' Dr. Coues makes

[1] The faunal nomenclature adopted is that of Dr. Allen in 'The Auk,' of April, 1893.

casual reference to it in the first edition of his 'Key' but omits it in the second edition.

The total lack of *hudsonicus* skins from the type locality is a fundamental defect, for upon the character of these depends the validity of *littoralis* and *ungava*. Should the Severn River types correspond to the Ungava birds, Dr. Bryant's form must stand and mine be regarded as a synonym of *hudsonicus*. There is a possibility that this is the correct arrangement but, as I have endeavored to show, it is improbable.

Another variety which, as such, has no place in the A. O. U. Check-List, was brought to public notice in 1884 by Dr. Coues in the second edition of the 'Key to North American Birds.' It is briefly introduced as follows:—"*P. h. evura* nobis. Alaska specimens are larger [than *hudsonicus*], the tail nearly 3 [inches]. Thus corresponding with *P. a. septentrionalis* and being quite the size of *P. cinctus*, from which distinguished by retaining precisely the coloration of *P. hudsonicus*." As will be shown, this race is as tenable as any other of the *hudsonicus* group. It is not, even in part, the same as *stoneyi*, which hails from a more arctic environment than any of the specimens examined by Dr. Coues.

P. h. columbianus, a third subspecies, was recently described by the writer in a preliminary report on the Birds of Washington and British Columbia, published in 'The Auk' (Jan., 1893). This race is characterized as larger and darker than any of a series of forty skins from Alaska and from other localities in British America. The type series was taken in the Rocky Mountains of southern British Columbia. Three additional skins, one each from the mountains east and west of the type locality in British Columbia, and one from the Rockies near the northwestern border of Montana, confirm my diagnosis that this race shows the highest development of the group both in size and depth of coloring.

A fourth form of *P. hudsonicus*, described by Mr. Ridgway in the appendix to his 'Manual of North American Birds' as a distinct species, *Parus stoneyi* (classed as a subspecies in our Check-List), is the last member of this perplexing group to claim attention. Its status has already been touched upon. To this list I feel justified in adding a fifth candidate, *P. hudsonicus*

ungava, representing the faunal peculiarities of northern Labrador and Newfoundland.

Geographic and climatic conditions in North America north of the United States result in a primary division of the country into two great life areas, the Temperate and the Arctic. Of these the Hudsonian Chickadee inhabits the southern border of the Arctic Realm and that part of the Temperate defined by Dr. Allen as the Cold Temperate Subregion, or the 'Boreal' of Dr. Merriam's faunal maps.

The Arctic Realm includes that part of the known habitat of *hudsonicus* from which were procured the types of Mr. Ridgway's *P. h. stoneyi* and my *P. h. ungava*. This district may be defined as a strip of varying width reaching along the Alaskan coasts and peninsulas of Bering Sea and the Arctic Ocean to the mouth of the Mackenzie River, thence to the mouth of the Nelson River and northward, including the north coasts of Labrador and Newfoundland. The Cold Temperate Subregion includes the type localities of *P. hudsonicus*, *P. h. evura*, *P. h. littoralis*, and *P. h. columbianus* and covers the remaining area of distribution of the group southward.

In the cases of *ungava* and *stoneyi* we have two races occupying very similar environments of minimum temperature and diminished flora but of differing humidity, and in all probability separated by a vast central area of the Barren Ground Fauna in which *hudsonicus* has no representative because of the almost total absence of trees in those regions. In *columbianus* we have another example of the maximum development of western races which, as in *evura*. Alaskan forms are sure to show, and in which the size generally increases as the habitat approaches the forty-ninth parallel.

Limiting ourselves to resident species of boreal North America, which show a tendency to split up into races, we quite invariably find the largest and darkest colored races in the southwest, either on the west slopes of the Rockies or in the West-Cascade region. The smallest light-colored forms hail from central and southeastern districts, while the extreme northwest and northeast produce forms of an intermediate character between the Rocky Mountain and Atlantic Coast races, the Labrador race being darker and somewhat smaller than its Alaskan counterparts, but not so dark

as the Rocky Mountain form. We may cite as illustrating this plan of racial distribution in Boreal and Arctic America, *Picoides americanus* with its subspecies *alascensis* and *dorsalis*, and *Acanthis linaria* with subspecies *holbœlli* and *rostrata*. One of the tables appended to this paper will show their parallel differentiation with the Hudsonian Chickadees. In the same table I also include certain forms of the Rock Ptarmigan (*Lagopus rupestris*) and the Horned Larks (*Otocoris alpestris*), whose habitats and manner of differentiation have the same correlation with those preceding. Of course the distribution of the Ptarmigans and Horned Larks is, in the first case, more arctic, and in the second, more continental than that of the other three species given, but, considered solely with reference to their boreal distribution, there is more than an ordinary resemblance among them all in spite of the marked differences in their habits.

Owing to the comparative scarcity of summer specimens in the series, I have based all important comparisons on skins secured after the fall moult and before the breeding season, viz., between the fifth of August and the first of May. It would have been preferable to limit these comparisons either to fall or early spring birds but the series was too small to justify it. As in other species of the genus, there seem to be no differences between the sexes of this Titmouse, either in size or color, and I have consequently considered the adults of both sexes as equally representative of the characters ascribed to the species or subspecies under which they are classed.

Seasonal color phases in the *Parus hudsonicus* group are so slight and simple, being chiefly the result of summer bleaching and abrasion, it is easy to make due allowance for such differences when determinations were necessarily made from breeding specimens. The plumage of the young is too poorly represented to warrant special mention.

1. Parus hudsonicus *Forst.* HUDSONIAN CHICKADEE.

HABITAT.—All of southeastern British America, except northern Labrador and Newfoundland, from Lake Athabasca and the Nelson River south to mountains of northeastern Minnesota, northern Wisconsin, Michigan, New York, Maine, New Hampshire, Vermont and Massachusetts.

The Hudsonian Chickadee rarely visits the lowlands south of the 47th parallel except on the coast, and it is practically non-migratory. It breeds in the Adirondacks, the White Mountains, and the mountains of Maine, but has not been found in the Alleghanies even in winter. Its distribution west of the Great Lakes is a mystery but as given above probably approximates closely to the lines of the Cold Temperate Subregion as defined by Drs. Allen and Merriam. In the absence of specimens from a vast area to the southeast of the Severn, we may take the average of a series of twenty-five from the United States and Canada. On this basis *hudsonicus* may be characterized as the smallest, and, with the exception of *stoneyi*, the palest of the group. Worn summer specimens from Nova Scotia and New Brunswick are browner and smaller than any others in the entire series. They represent the *littoralis* extreme described by Bryant but show no differences of special diagnostic value from Ontario or United States birds, or from the specimen from Moose Factory. A fine series of spring birds from New Brunswick shows, with selected skins of like date from the United States, that *hudsonicus* is more unicolor on the upper parts, the pale reddish brown of crown differing but slightly from that of back. The same unicoloration is noticeable in *evura*, which is even more decided brown over the dorsal area in that race.

The only common character shared by *hudsonicus* and *ungava*, as compared with their western allies, is in the small size and attenuation of the bill.

Average measurements of 30 adults:—Wing, 61 mm. (58–64); tail, 60 (58–64); tarsus, 16 (15.5–16.5); bill from nostril, 7 (6.5–7.5).

Specimens and localities:—Moose Factory, St. James Bay, 1; Richmond Hill, Ontario 1; Ottawa, Ontario, 1; Beauport, Ontario, 1; Campbellton, N. Brunswick, 19; Point Lepreaux, N. Brunswick, 1; "New Brunswick," 2; Steiwacke, N. Scotia, 2; Halifax, N. Scotia, 1; "Nova Scotia," 1; "Labrador," 2; Island Falls, Maine, 1; Wadley Brook, Maine, 1; Sutton, Vermont, 1; Mt. Adams, Mass., 1; St. Regis Lakes, N. York, 2.

2. Parus hudsonicus ungava, subsp. nov. LABRADOR CHICKADEE.

HABITAT.—Northern Labrador.

Subsp. char.—Larger, darker above and with slightly larger bill than *hudsonicus*. Plumbeous brown of crown and nape showing more marked

contrast to colors of upper parts and more extended posteriorly than in any other form. Sides of neck purer ash-gray than *hudsonicus*, that color nearly surrounding and contrasting with the crown as in *stoneyi*.

Adult male and female in spring plumage:—Types,[1] ♂ No. 100,630; ♀, No. 93,565; Coll. Smithsonian Institution, Washington, D. C., coll. by L. M. Turner at Fort Chimo, Ungava, Labrador, March 17 and April 1, 1884.)—Crown, chocolate to plumbeous brown (never pale or ashy brown) well defined posteriorly against the ashy brown of back and laterally against the ash-gray sides of neck, which color, in extreme cases, nearly encircles crown. Dorsal area nearly uniform ashy brown, becoming rusty on rump. Wing feathers not only edged but secondaries distinctly tipped with ashy. Tail uniform slate, less ashy than in *hudsonicus* or *evura*. Throat and bill purer, clearer black; ocular spots larger, nearly black anteriorly and always(?) connected by well-defined frontlet of same color.

Measurements.—♂, No. 100,630; wing, 67 mm.; tail, 67; tarsus, 16.5; bill from nostril, 7. ♀, No. 93,565; wing (abraded) 63 mm.; tail (abraded) 63; tarsus, 16; bill from nostril, 6.6.

This race is as strongly characterized as *columbianus*, from which it differs in its smaller size, shorter and slenderer bill, and richer brown coloration, the brown of crown and nape being less dusky and that of sides more rusty as in *hudsonicus*. Compared with any of its allies, *ungava* shows better color definition, the dark brown of crown and nape contrasting abruptly with ashy cast of back instead of mingling insensibly into the shades of upper parts as in *hudsonicus* and *evura*. The dark spot surrounding the eye is also large and well defined and always present in such specimens as I have, while in all other forms except *columbianus* it is often nearly obsolete. The ashy white of sides of neck in *ungava* is even more noticeable than in *stoneyi* because of the darker hue of crown in former. The nearest ally of *ungava* is undoubtedly *stoneyi*, *evura* coming nearest *hudsonicus*, *columbianus* showing no decided affinities in either direction.

The only portion of the habitat of *ungava* represented by adult specimens is the region about Fort Chimo. A young bird from Rigolette shows same color values as the adults. It is recorded

[1] The only adult spring male in the Ungava series is typical in all respects save in the color of the crown, which is much lighter than the average, and the only typical spring female is somewhat darker than the average and is in worn plumage. No single spring specimen combines the requirements of a type, so I have thought it preferable to meet these requirements in the two skins selected than in a single winter specimen.

by Mr. Packard[1] from Okak, two hundred miles east of Ungava. Mr. McIlwraith sends three specimens labelled "Labrador." Of these probably two were taken south of the habitat of *ungava* and within the range of *hudsonicus*, with which form they seem to perfectly agree.[2] The range of *ungava* is probably coextensive with that of the Arctic Realm across northern Newfoundland. Its westward extension to and beyond the shores of Hudson's Bay can only be conjectured.

Average measurements of 15 adults:—Wing, 65.5 mm. (63 to 68); tail 65, (63 to 68); tarsus 16 2 (16 to 16.5); bill from nostril, 7 (6.5 to 7.5).

Specimens and localities:—Fort Chimo, Labrador, 14; Rigolette, Labrador, 1. "Labrador," (intermediate?) 1.

3. Parus hudsonicus stoneyi *Ridgw.* KOWAK CHICKADEE.

HABITAT.—Northwestern Alaska.

Mr. Ridgway's description of this race not only ignores any subdivision of the species *hudsonicus* but contains no reference to the *evura* of Dr. Coues with which it is almost identical in measurements. The special characters given by Mr. Ridgway to *stoneyi* are, however, in no sense synonymous with those of *evura* as stated by Dr. Coues. *Stoneyi* is characterized as "similar to *P. hudsonicus* but much grayer above, sides of neck purer ash gray, sides much paler rusty and throat clear slate black instead of sooty blackish." The measurements given for *stoneyi* by Mr. Ridgway are greater than his measurements of *hudsonicus* though he included under that name all the rest of the group, but he makes no reference to the comparative size of *stoneyi*, probably from the very reason that other Alaskan birds were as large. On the contrary Dr. Coues bases his *evura* solely on the larger size of Alaskan birds as compared with eastern ones and takes care to state that Alaskan birds retain the precise coloration of *hudsonicus*. My examinations of the two original specimens of *stoneyi*, which still remain the only adult representatives of their race in collections, fully confirm the value of the color diagnosis given to this form by its describer. It may now be more fully characterized as the palest of the group with wing measurements about the same as *ungava*, the bill being stouter

[1] Proc. Bost. Soc. Nat. Hist., Vol. X, p. 267.

[2] Mr. McIlwraith has since written me they all came from "southern Labrador."

and the tail averaging longer, being quite as long as in *columbianus*.

As stated in 'The Auk,' the three specimens of *stoneyi* are in bad shape and lack date of capture. One, in well advanced nestling plumage, is worthless for critical comparisons with adults. The other two are alike and characteristic enough to justify their present status in our nomenclature. Skins of *P. hudsonicus* from Nulato, Alaska, are of interest, confirming the close approach of boreal forms to the Arctic coast in the vicinity of Norton Sound, as defined by Allen and Merriam, such specimens being typical *evura* and not *stoneyi*.

Average measurements of 2 adults:—Wing, 64 mm. (62 to 66); tail, 66 (64 to 68); tarsus, 16.3 (16 to 16.5); bill from nostril, 7.1 (7 to 7.2).

Specimens and localities:—Kowak or Putnam River, Alaska, 3.

4. Parus hudsonicus evura *Coues*. ALASKAN CHICKADEE.

HABITAT.—Central and southern Alaska, west to Nulato, south to Bristol Bay and Fort Kenai, east to the Mackenzie River.

As stated in preceding descriptions, the Alaskan Chickadee seems to as fully merit recognition on account of size as the Kowak River race for its lighter coloration when the two are compared with *hudsonicus*. Mr. Ridgway alludes, in his description of *stoneyi*, to the "browner" appearance of certain Alaskan skins, but considers it merely a seasonal variation. With these skins now before me I find the average color of specimens from the habitat of *evura* is almost identical with that of *hudsonicus* at the same season and would call *evura* a large and much browner *hudsonicus*, intermediate between *hudsonicus* and *columbianus*.

Average measurements of 14 adults:—Wing, 65.4 mm. (60 to 70); tail 65 (61 to 68); tarsus, 16.8 (16.5 to 17); bill from nostril 7.2 (6.7 to 8).

Specimens and localities:—Fort Simpson, Mackenzie River, 3; "Fort Rae," Mackenzie District (?) 2; Fort Yukon, Alaska, 2; Nulato, Alaska, 5; Fort Kenai, Alaska, 2.

5. Parus hudsonicus columbianus *Rhoads*. COLUMBIAN CHICKADEE.

HABITAT.—Rocky Mountains, from the Liard River south into Montana.

Little may be added to the original description of this subspecies. Two additional specimens secured in 1889 in British Columbia have been kindly loaned by Prof. J. Macoun of the Canadian Geological Survey. They confirm the characters assigned to the type specimens, and are of special interest as having been taken respectively on the Gold and Selkirk Ranges, nearly one hundred miles south and west of the central Rockies at Field.

Another specimen of *columbianus*, no less typical, was taken by Mr. G. B. Grinnell in 1888 at St. Mary's Lakes in the Rocky Mountains, a few miles south of the northern boundary of Montana. Besides the absence of any decided shade of brown on upper parts, throat and loral region noticeable in fall specimens of all the other forms, *columbianus* has a longer, much heavier and thicker bill than any of them, that member being nearly twice the calibre of smaller *hudsonicus*.

While *columbianus* may be classed as the greatest remove in the direction of specific separation from *hudsonicus*, I feel no hesitation in classing it, with the others, as nothing more than a subspecies of Forster's type.

Average measurements of 7 adults:—Wing, 67 mm. (65 to 71); tail, 66 (64 to 69); tarsus, 17 (16.5 to 17.5); bill from nostril, 7.6 (7.3 to 8.3).

Specimens and localities:—Field, British Columbia, 4; Eagle Pass, B. C., 1; Toad Mountain, B., C., 1; St. Mary's Lakes Montana, 1.

TABLE OF MEASUREMENTS[1] OF THE *Parus hudsonicus* GROUP.

Skins		Wing		Tail		Tarsus		Bill, from nostril	
30	Parus hudsonicus	58–64	(61)	58–64	(60)	15.5–16.5	(16)	6.5–7.5	(7)
15	Parus hudsonicus ungava	63–68	(65.5)	63–68	(65)	16 –16.5	(16.2)	6.5–7.5	(7)
2	Parus hudsonicus stoneyi	62–66	(64)	64–68	(66)	16 –16.5	(16.3)	7 –7.2	(7.1)
14	Parus hudsonicus evura	60–70	(65.4)	61–68	(65)	16.5–17	(16.8)	6.7–8	(7.2)
7	Parus hudsonicus columbianus	65–71	(67)	64–69	(66)	16.5–17.5	(17)	7.3–8.3	(7.6)

[1] Measurements in millimetres.

TABLE SHOWING PARALLEL GEOGRAPHIC VARIATIONS IN CERTAIN BIRD RACES OF NORTHERN NORTH AMERICA.

Hudso-Canadian	Barren Ground	Alaskan-Arctic	Alaskan	Northern Rocky Mountains
Size smallest; color light.	Size large; color dark.	Size large; color lightest.	Size larger; color intermediate.	Size largest; color darkest.
Parus hudsonicus	P. h. ungava	P. h. stoneyi	P. h. evura	P. h. columbianus
Picoides americanus	Picoides, subsp?	(Absent)	P. a. alascensis	P. a. dorsalis
Acanthis linaria	A. l. rostrata	A. l. holbœllii		(Non-resident)
Lagopus rupestris	L. r. reinhardti	L. r. nelsoni et athkensis		Lagopus, subsp?
Otocoris alpestris		O. a. leucolæma		O. a. merrilli

OBSERVATIONS ON THE BREEDING HABITS OF *LARUS ATRICILLA* IN MASSACHUSETTS.

BY GEORGE H. MACKAY.

IN THE neighborhood of Muskeget and Tuckernuck Islands, Massachusetts, Laughing Gulls were formerly much more numerous than at present, being abundant there, I am informed, in 1850. In 1880 they were scarce, yet I am told a few pairs bred on Muskeget Island during that summer. During the past few years they have again appeared in the vicinity of the above-named islands in increasing numbers, undoubtedly from the protection which has been given them. The summer of 1890 showed a considerable increase in their numbers over former years, but the number resident during the summers of 1891 and 1892 was apparently about the same, and possibly there may not have been quite so many in either of those years as in 1890. The summer of 1893, however, shows an increase over 1890, which was the best for a number of years previous to that date.

On May 14, 1893, two birds were seen. and about a dozen more heard; they were very high up. These were the first arrivals noted this season on Muskeget Island. On May 17 a strong breeze from the south was blowing and about twelve birds were seen flying low down over Muskeget. On May 28 about thirty were noted; they were mixed in and flying with the Wilson Terns (*Sterna hirundo*) and were hovering close to the ground. On June 7, 1893, four nests were discovered near the centre of the island, being the first found this season. One of these contained two eggs, the others being empty. The most of the birds, however, seemed to be collecting on the north side of the island with the evident intention of breeding in that locality.

They usually appear about these islands during the month of May, and depart in October. The first birds were noted in 1892 on May 10 (two pairs) at the north pond, Tuckernuck. In 1893 they were first noted on May 7 near the same place (four pairs).

They prepare their nests about the first of June; these are regularly constructed and are composed of interwoven dried sea grass (*Zostera marina*), grass, and stubs of beach grass (*Ammophila arundinacea*). The inside of the nest is about the size of an ordinary saucer, and it is usually placed at the foot of a tall bunch of grass, under a bush, or in beach peas (*Lathyrus maritimus*). Often it is well concealed; at other times it is exposed to view and easily seen at a distance of a few feet. I have also seen it placed on top of a bunch of old beach grass stubs surrounded by beach peas, which is a favorite location. This was noticeably the case in 1893, when on June 20 I found eight nests, and one on July 3 with two eggs, in such position that all were within forty yards of each other. They nest in colonies in this locality, and when one nest is discovered it is nearly certain others may be found near by.

In the summer of 1892 these birds nested on Muskeget between the slight headland (one of the old shore lines) and the shore, on the north side of the island and within two hundred and fifty yards of the ocean and about twenty-five yards from a small fresh water pond. The nests were placed on the slope of the headland towards the shore, where there was an abundance of rank grass about two feet and a half high. In 1891 a few pairs built in a salt marsh or meadow on the south side of the island, the nests

being placed on one of the higher sand ridges or hummucks, with which the marsh was interspersed, and which were covered with high grass. A few pairs (three or four) nested very near this same place in June 1893, but the larger number I found to be nesting about fifty yards further inland from the spot where they bred in 1892. This nesting place was in a depression or basin where the beach peas were growing in profusion, and here I found nine nests (all the eggs in which were partially incubated), all of which were composed entirely of beach grass stubs about five or six inches long, interwoven and placed on top of a cluster of dead stubs of the same material the tops of which had disappeared, which raised the nest some five or six inches from the sand. There was little attempt made at concealment, that little being furnished by the higher growth of the beach peas which surrounded them. These two places were the only ones on the island where I discovered their nests, or noticed that they congregated and I much doubt if there are any others in this locality. Of the nine nests discovered each contained three eggs except two which had two only. On June 22, 1893, four or five more nests were discovered by some of my friends not far from where I found mine, all of which contained three eggs each. I was on the island of Muskeget July 3 and 4, 1893, but saw no young. While I am not certain how many eggs constitute a complete set, I am of the opinion that the number is three.

During the summer of 1890 four nests were found on July 10, each of which had five eggs, and in 1891 and 1892 other nests were found which also had five eggs in each, all the other nests discovered in these years having two or three eggs each. It is possible more than one female may have deposited eggs in the same nest. The eggs are nearly if not quite three times as large as those of *Sterna hirundo*, which some of them somewhat resemble, though darker in color, being as large as a pullet's egg. Their ground color is pale olivaceous, with a slight tinge of brown which last in some eggs shows stronger than in others. In some sets this ground color assumes a muddy appearance, while in others it is quite clear. The entire egg is covered over with dark chocolate-colored irregular marks and spots, which in some eggs run one into the other at the larger end, making it the most prominently chocolate-marked portion of the egg.

When walking over Muskeget Island I have noticed that these birds leave the nest when I am a *long* distance away, being probably apprised by the commotion made by the other Terns, as the Wilson's (*Sterna hirundo*), Arctic (*Sterna paradisæa*) and Roseate (*Sterna dougalli*), of my invasion of their precinct, and mounting high in the air circle around, continually giving vent to their peculiar cries. They have two distinct ones, but I do not feel competent to so put letters together that they will convey the sound of either to the reader. One of these is the peculiar note from which this bird probably derives its name of Laughing Gull, it being a weird, wild, maniacal sound, bearing a resemblance to a laugh, which at once impresses one on being heard. I should not call them courageous birds, as far as I have observed them, for I have frequently seen a single *Sterna hirundo* chase and put one to flight, which would endeavor to escape without offering any resistance. I have also seen four or five Laughing Gulls *concertedly* chase and put to flight a single *Sterna hirundo* which offered no resistance to such odds.

While I do not know if it is always the case elsewhere, I have often noticed that these Gulls keep together and fly in pairs, and even if a number are about, this characteristic is noticeable. Should danger be apprehended they will mount high in the air and circle, continually uttering their peculiar cry, which can be heard for a very long distance. I consider them rather shy except when they have young.

ADDITIONAL NOTES ON THE BIRDS OF THE SUWANEE RIVER.

BY ARTHUR T. WAYNE.

THE month of March, 1892, the writer spent at Branford, Florida. Trips were made on both sides of the river, and as far down as where the Santa Fe Creek empties into the Suwanee. This region has already been described by Messrs. Brewster and Chapman, therefore I will not describe it anew. The following

species which I observed during the month of March, were not recorded by Messrs. Brewster and Chapman.

Tantalus loculator.

Aramus giganteus.— Common all along the Suwanee. From Santa Fe Creek to Week's landing, fifteen miles from the Gulf, I found this species actually common. It breeds in March.

Totanus flavipes.

Ægialitis vocifera.— Common resident.

Colinus virginianus floridanus.— I found the Quail very abundant at Branford, and throughout the forests bordering the river.

Accipiter cooperi.— Breeds. A common species, even in June, when it was the terror of the poultry yard.

Falco sparverius.— A common resident.

Megascops asio floridanus.— Resident. All I examined were in the red phase.

Antrostomus vociferus.— I shot a single individual on March 16, but it was badly mutilated and only the tail feathers were preserved. The keeper of the hotel who is very familiar with this bird, told me he heard its note every spring at Branford.

Zonotrichia albicollis.

Spizella socialis.

Spizella pusilla.

Certhia familiaris americana.— The Brown Creeper was common from March 10 to 20, inclusive.

The first week in April I left Branford and went to Old Town, sixty miles down the river, where I remained until the first week in August. I visited Old Town again in February, 1893, and remained until the last week in May. I give here a list of the birds I observed which have not been recorded from this region, with dates of arrival.

Pelecanus erythrorhynchos.— This is a common species on the Gulf, near the mouth of the river, where they congregate in vast numbers. It remains until the middle of May.

Fregata aquila.— Occasionally seen flying very high over the river just before a storm. Also seen at 'Fishbone.'

Botaurus lentiginosus.— One bird noted March 3, 1893.

Ionornis martinica.— April 8 (1892). Breeds.

Gallinula galeata.— April 10 (1892).

Ictinia mississippiensis.— April 20 (1892).

Coccyzus americanus.— A common species. Breeds in May.

Chordeiles virginianus chapmani.— April 5 (1892).

Contopus virens.— April 23 (1892).

Empidonax acadicus.— April 15 (1892). Breeds commonly in the swamps.

Dolichonyx oryzivorus.— April 15 (1892).

Icterus spurius.— An immature male observed April 23, 1893.

Poocætes gramineus.— Common until April 15.

Passerina cyanea.— April 25 (1892).

Vireo solitarius alticola.— The only specimen, secured February 23, 1893, must be referred to this form.

Helmitherus vermivorus.— April 4 (1892).

Dendroica tigrina.— An adult male in high plumage, taken April 15, was the only one seen.

Dendroica cærulescens.— April 18 (1892).

Dendroica pensylvanica.— April 10 (1892).

Dendroica striata.— April 24 (1893). Not common.

Seiurus noveboracensis.— Taken April 24, 1893.

Geothlypis agilis.— This species arrives late. I shot a female on May 10 and a male the next day. Both were on the ground, among saw palmetto, in the river swamp.

Geothlypis formosa.— April 21 (1892).

Turdus mustelinus.— Only a single bird heard singing April 24, 1893.

The following species evidently winter numerously in this region, as fifty or more individuals of each were noted on February 13, the time of my arrival: *Mniotilta varia*, *Compsothlypis americana*, *Seiurus aurocapillus*.

Remarks.

Campephilus principalis.— I obtained thirteen specimens in April, and saw about ten more. A young female taken April 15, was about two weeks from the nest. I never observed it singly, it being always seen in company with two or three others of this species. I was told by old hunters that they breed early in February. The locality where this bird is to be found at all times is what the people call 'burn-outs.' These are large tracts of heavy timber which the forest fires have destroyed; and the dead trees harbor beetles, etc. A nest which I examined was dug in a live cypress about fifty feet high.

Vireo flavifrons.— I found this bird breeding commonly everywhere. A pair had their nest in a large red oak tree near the house in which I was staying.

Helinaia swainsonii.— Breeds abundantly on the lower Suwanee. This is the most southern record of its breeding.

Helminthophila bachmani.— This species is only a migrant. It does not breed in the Suwanee River bottom, as Mr. Brewster suspected. I secured, all told, about fifty specimens.

OBSERVATIONS ON THE BIRDS OF JAMAICA, WEST INDIES.

BY W. E. D. SCOTT.

II. A LIST OF THE BIRDS RECORDED FROM THE ISLAND, WITH ANNOTATIONS.

(*Concluded from p. 181.*)

177. **Ampelis cedrorum** (*Vieill.*). CEDARBIRD.—Recorded by Gosse (Birds of Jamaica, 1847, p. 197), on the authority of Mr. Hill.

178. **Laletes osburni** *Scl.*—Not observed at the points visited by the writer.

179. **Vireo altiloquus** *Gamb.* WHIP-TOM-KELLY.—A migrant and summer resident. Said to be common in the regions near the coast. Not observed during the time spent on the island.

180. **Vireo modestus** *Scl.* SEWY-SEWY.—A rather common species at all points which were visited. The birds were generally associated in pairs and reminded one strongly, in their method of life and general habits, of *Vireo noveboracensis*. Up to the time of my departure from the island these birds showed no signs of the approach of the breeding season.

181. **Cœreba flaveola** (*Linn.*). BLACK-AND-YELLOW HONEY-CREEPER. HONEY-SUCKER. BANANA QUIT.—One of the most abundant and generally distributed species. Often at Boston a dozen could be seen on the trees and bushes close to the house. There is much variation in the intensity of the dark color of the throat. From intense, clear, dark slate, almost black, at one extreme, every grade is to be found to faint slate color much mixed with yellow feathers of the same color as the belly.

These birds had not begun to breed at the time I left Jamaica. Gosse speaks of finding the nests "in those low trees and bushes, from which depend the paper nests of the brown wasps," and gives May, June, and July as the breeding season. (Birds of Jamaica, p. 85.)

182. **Cœreba cyanea** (*Linn.*).—Mr. C. B. Taylor took on Elletson Road, Kingston, on May 17, 1890, an adult male of this species, which is now in the author's collection (No. 12,946). There seems possibility that this may have been an escaped caged bird, as the tail-feathers are somewhat worn; it must, however, be recorded as having been observed and taken on the island.

183. **Glossiptila ruficollis** (*Gmel.*). ORANGE QUIT. BLUE QUIT.—Not quite as common as *C. flaveola* and more confined to the higher altitudes, though also observed at the sea level. There is a great preponderance of females and males in immature plumage, over the adult males,

blue with bright chestnut throat patch. Of forty-nine individuals collected but fourteen are adult males. Two birds are in intermediate plumage though not moulting, showing traces of the blue adult plumage and some chestnut feathers on the throat. The birds bred in June and the nest is described by Gosse (Birds of Jamaica, p. 237). Quite gregarious at Stony Hill. In December the birds feed exclusively on mangos, 'sour sop,' and other wild fruits, so far as could be ascertained.

184. **Mniotilta varia** (*Linn.*). BLACK-AND-WHITE WARBLER.—Not uncommon during December and January at all points visited on the island.

185. **Helinaia swainsonii** *Aud.* SWAINSON'S WARBLER.—Recorded by A. & E. Newton (Handbook of Jamaica, 1881, p. 105). Mr. Taylor regards this and the following species as very rare on the island.

186. **Helmitherus vermivorus** (*Gmel.*). WORM-EATING WARBLER.—Specimens of this species were taken at Stony Hill on December 1, 13, and 16, 1890, and at Priestman's River on January 8 and 17, 1891. It seems to be a regular winter resident, though rare.

187. **Compsothlypis americana** (*Linn.*). PARULA WARBLER.—A common migrant and winter resident. Met with at all points visited.

188. **Dendroica tigrina** (*Gmel.*). CAPE MAY WARBLER.—A not uncommon winter resident. Individuals were procured at all points where collecting was prosecuted, some ten in all.

189. **Dendroica petechia** (*Linn.*).—At Buff Bay on December 24, 1890, I saw a Yellow Warbler which was probably to be referred to this form, and this was the only time that the species was observed by me. Gosse regarded it as a migrant and winter visitor. (Birds of Jamaica, p. 157.)

190. **Dendroica eoa** (*Gosse*). AURORA WARBLER.—The type specimens of this species are in the collections of the British Museum. They were taken in January (21 and 24) in the same locality on the island by the late Philip Henry Gosse.

191. **Dendroica cærulescens** (*Gmel.*). BLACK-THROATED BLUE WARBLER.—A rather common winter resident, and generally distributed.

192. **Dendroica coronata** (*Linn.*). MYRTLE WARBLER.—Observed throughout the winter months in small companies, and not generally distributed.

193. **Dendroica striata** (*Forst.*). BLACKPOLL WARBLER.—For records of this species see A. & E. Newton, Handbook of Jamaica, 1881, p. 106.

194. **Dendroica pharetra** (*Gosse*). ARROWHEADED WARBLER.—A species described by Gosse from a single individual taken on the 9th of February on the top of Bluefields Peak.

195. **Dendroica dominica** (*Linn.*). YELLOW-THROATED WARBLER.—A common winter resident and probably breeds, though Gosse regarded it as a migrant species, and yet speaks of individuals obtained on August 16.

196. **Dendroica dominica albilora** *Baird.* SYCAMORE WARBLER.—Of forty-six Yellow-throated Warblers collected on the island twenty-two are referable to *D. dominica* and twenty-four are clearly typical represent-

atives of *D. dominica albilora*. These birds were collected at several points, but were perhaps a little more common at the lower levels.

197. **Dendroica virens** (*Gmel.*). BLACK-THROATED GREEN WARBLER. —Not met with by the author. See A. & E. Newton, Handbook of Jamaica, 1881, p. 106.

198 **Dendroica palmarum** (*Gmel.*). PALM WARBLER.—Taken at Stony Hill and at Priestman's River, and noted at Kingston. Not very common.

199. **Dendroica palmarum hypochrysea** *Ridgw.* YELLOW PALM WARBLER.—A single individual was observed in a garden in Kingston on December 20, 1890, by the author.

200. **Dendroica discolor** (*Vieill.*). PRAIRIE WARBLER.—A rather common species at the points visited. Some probably breed on the island, for Gosse recorded the species on the 18th of August. (Birds of Jamaica, p. 159.)

201. **Seiurus aurocapillus** (*Linn.*). OVENBIRD.—A not uncommon winter resident.

202. **Seiurus noveboracensis** (*Gmel.*). WATER-THRUSH.—Met with but once on the island, ♂ (No. 10,524), Priestman's River, 21 January, 1891.

203. **Seiurus motacilla** (*Vieill.*). LOUISIANA WATER-THRUSH.—Taken at Stony Hill and Priestman's River, six specimens in all. A rather common winter resident.

204. **Geothlypis trichas** (*Linn.*). MARYLAND YELLOWTHROAT.— Obtained at all points visited. A common winter resident. I did not remain late enough on the island to ascertain if the species breeds there.

205. **Sylvania mitrata** (*Gmel.*). HOODED WARBLER.—Not observed. See Baird, Rev. Am. B., p. 239, and A. & E. Newton, Handbook Jamaica, 1881, p. 106.

206. **Setophaga ruticilla** (*Linn.*). AMERICAN REDSTART.—A common winter resident. Probably breeds, as Gosse records it from the mountains of St. Elizabeth on August 10. (Birds of Jamaica, p. 165.)

207. **Mimus hillii** *Maréch.*—Very local in distribution and appears to be rare even where it occurs. I did not meet with representatives. At a point near Port Henderson, about opposite Port Royal, across the bay, is a point known as Salt Pond hills. It is an arid region with much cactus growing. Mr. C. B. Taylor tells me that he has met with this species only at this point, where he took two birds in June, 1891.

208. **Mimus orpheus** (*Linn.*). JAMAICA MOCKINGBIRD. One of the most abundant and conspicuous species in the lowlands, becoming more uncommon at high altitudes. Seen everywhere and in full song late in December and early in January. They were nesting generally at Priestman's River by February 20.

209. **Myadestes solitarius** *Baird.* SOLITAIRE.—Said to be an abundant species at all points of very high altitude, and commonly believed to be restricted in its lowest range to about 5000 feet above the sea. On Febru-

ary 5, 1891, in the hills back of Priestman's River, at an altitude of 1500 feet above the sea, these birds were not at all uncommon, but were shy and difficult to obtain. They were well known to the people living in the vicinity, who call them 'Nightingales,' and who say they live here the year around and breed. This is the only point where I found these birds, and during my stay I procured but three individuals though many were seen and heard.

210. **Merula aurantia** (*Gmel.*). HOPPING-DICK. TWO-PENNY-CHICK. —This species, closely allied to the following one, is found at lower levels, in fact down to the sea, in thick, woody places. I frequently heard, but very rarely saw this Thrush, and only secured a few examples. It is said to have been formerly very common, and is doubtless one of the species which has suffered by the introduction of the mongoose. For a description of the breeding habits see Gosse, Birds of Jamaica, p. 14.

211. **Merula jamaicensis** (*Gmel.*). SHINE-EYE. GLASS-EYE.—Rather common in the thick woods above fifteen hundred feet, but very shy and difficult to collect, frequenting very thick jungles, and often heard, but seldom seen.

212. **Turdus mustelinus** *Gmel.* WOOD THRUSH.—Not observed. Recorded by Gosse, Birds of Jamaica, p. 140.

PRELIMINARY DESCRIPTIONS OF ONE NEW SPECIES AND TWO NEW SUBSPECIES OF BIRDS FROM THE ISLAND OF TRINIDAD.

BY FRANK M. CHAPMAN.

THE PUBLICATION of a paper on the birds of the Island of Trinidad, based on collections and observations made during March and April of the present year, being unavoidably delayed, I have decided to present here brief diagnoses of several new birds which will be described at length in a future number of the Bulletin of the American Museum of Natural History.

Chlorospingus leotaudi[1] sp. nov.

Char. sp.—Apparently most like *C. chrysogaster* Tacz. in coloration but much smaller and with a larger bill.

[1] Named in honor of the late Dr. A. Léotaud, author of 'Oiseaux de l'Ile de la Trinidad.'

Description of type (coll. Am. Mus. No. 59,051, female, Princestown, Trinidad, March 28, 1893, F. M. Chapman).—Crown and nape cinereous washed with olive green, back bright olive green, wings and tail fuscous, the exposed margins of the feathers olive green; auriculars cinereous, throat and upper part of the breast pale grayish white, rest of the under parts bright yellow; bill horn-black, feet brownish black; wing, 2.40; tail, 2.25; exposed culmen, .50; height of bill at anterior margin of the nostril, .22 in.

Basileuterus vermivorus olivascens subsp. nov.

Char. Subsp.—Similar to *B. vermivorus* (Vieill.) but the bill averages larger and the upper parts are constantly grayer. (Type, coll. Am. Mus. No. 58,974, adult male, Princestown, Trinidad, March 1, 1893, F. M. Chapman.)

Myrmeciza longipes albiventris subsp. nov.

Char. subsp.—Similar to *M. longipes* (Swains.), but somewhat smaller and with the flanks and abdomen pure white, slightly or not at all washed with cinereous. (Type, coll. Am. Mus. No. 59,329, adult male, Princestown, Trinidad, March 10, 1893, F. M. Chapman.)

RECENT LITERATURE.

Shufeldt on Fossil Birds from Oregon.—In a quarto memoir[1] of thirty-five pages, with three plates, Dr. Shufeldt gives the final results of his studies of several hundred fossil bones of birds, collected at Fossil and Silver Lakes, Oregon, by Professors Thomas Condon and E. D. Cope, of which a preliminary account was given in the 'American Naturalist' for April, 1891 (pp. 359–362). "The Silver Lake Region of Oregon is considered to be of the latest Tertiary formation of the horizon known as the Equus Beds." About 50 species were recognized, of which 27 are positively identified with species still existing in the region, 5 as probably identical with living species, and 17 as extinct, as follows:—

[1] A Study of the Fossil Avifauna of the Equus Beds of the Oregon Desert. By R. W. Shufeldt, M. D. Journ. Acad. Nat. Sci. Phila., Vol. XI, pp. 389 425, pll. xv-xvii, 1892.

Existing Species.

Æchmophorus occidentalis
Colymbus holbœlli
Colymbus auritus
Podilymbus podiceps
Larus argentatus smithsonianus
Larus californicus?
Larus philadelphia
Xema sabinii
Sterna elegans?
Sterna forsteri?
Hydrochelidon nigra surinamensis
Pelecanus erythrorhynchos
Lophodytes cucullatus
Anas boschas
Anas americana
Anas carolinensis
Anas discors
Anas cyanoptera?
Spatula clypeata
Dafila acuta
Aix sponsa
Aythya marila nearctica?
Glaucionetta islandica
Clangula hyemalis
Branta canadensis
Anser albifrons gambeli
Chen hyperborea
Fulica americana
Phalaropus lobatus
Tympanuchus pallidicinctus
Pediocætes phasianellus columbianus.
Bubo virginianus.

Extinct Species.

Larus robustus, sp. nov.
Larus oregonus, sp. nov.
Phalacrocorax macropus (*Cope*)
Anser condoni, sp. nov.
Branta hypsibatus *Cope*
Branta propinqua, sp. nov.
Olor paloregonus (*Cope*)
Phœnicopterus copei, sp. nov.
Ardea paloccidentalis, sp. nov.
Fulica minor, sp. nov.
Pediocætes lucasi, sp. nov.
Pediocætes nanus, sp. nov.
Palæotetrix gilli, gen. et sp. nov.
Aquila pliogryps, sp. nov.
Aquila sodalis, sp. nov.
Scolocophagus affinis, sp. nov.
Corvus annectens, sp. nov.

It thus appears that the bird life of this region in Pliocene time was not so very different from that of the same area today. As Dr. Shufeldt observes: "Great flocks of Swans, Geese and Ducks were there, feeding on the marshy shores of the lake or disporting themselves upon its waters. With but few exceptions they were of modern genera and species. A ponderous Goose appeared among them, perhaps but sparingly during Pliocene time, for it must have been nearly extinct. And a Swan, too, whose race has since died out was also there, but it was of a size quite in keeping with present day Swans. . . . To these groups we must add many individuals of a species of a great, strange Cormorant (*P. macropus*), larger than any of our existing Comorants. . . . But the strangest figure upon the scene among the birds was a true Flamingo. It could not have been very abundant, for it has left but scanty remains. Still it was there, and its presence has its meaning, — it may even suggest ideas

as to what the climate may have been in those times. . . . To speak again of the climate, it might well be compared with the present climate of Florida and the lower part of Louisiana, with the vegetation fully as luxuriant as it is now in those parts and with the palms more abundantly represented."

Dr. Shufeldt's memoir is thus a very interesting and important contribution to the early history of bird life in North America. Although he has fortunately had a comparatively large amount of material for examination, the field is obviously not exhausted, so that much may be hoped from further exploration of even this same region.—J. A. A.

Shufeldt on Ichthyornis, and on the Classification of the Longipennes. —In a paper entitled 'Comparative Osteological Notes on the Extinct Bird *Ichthyornis*'[1] Dr. Shufeldt reaches the conclusion that this type, while resembling in many points the Gulls and Terns, shared more characters in common with the Skimmers. Much of the paper is, in fact, given up to a discussion of the relationship of the Skimmers (Rhynchopidæ) to the Laridæ, reaching the conclusion that while the Gulls and Terns gradually approach each other, through such forms as *Xema*, *Creagrus*, and *Gelochelidon*, as long since stated by Coues, the Skimmers are sharply separated from either, and are well entitled to the rank of a distinct family, as placed in the A. O. U. Check-List. In a later paper[2] he returns to the subject, and after reviewing various previous classifications of the group, proposes that already adopted in the A. O. U. Check-List as best agreeing with his extended osteological studies of the North American forms.—J. A. A.

The Affinities of Hummingbirds and Swifts.—The pros and cons of the relationship of Hummingbirds and Swifts have recently been presented in various more or less controversial papers on the subject by Dr. Shufeldt[3] and Messrs. Ridgway[4] and Lucas.[5] As is well known, Dr.

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[1] Journ. Anat. and Phys., XXVII, pp. 336–342.

[2] On the Classification of the Longipennes. By R. W. Shufeldt. Am. Nat., March, 1893, pp. 233–237.

[3] Ridgway on the Anatomy of Hummingbirds and Swifts. By R. W. Shufeldt. Am. Nat., April, 1892, pp. 869, 870.

Ridgway on the Anatomy of the Hummingbirds and Swifts.—A Rejoinder. By R. W. Shufeldt. Am. Nat., April, 1893, pp. 367–371.

Comparative Notes on the Swifts and Hummingbirds. By R. W. Shufeldt. Ibis, Jan., 1893, pp. 84–100.

[4] Shufeldt on the Anatomy of the Hummingbirds and Swifts. By Robert Ridgway. Am. Nat., Dec., 1892, pp. 1040, 1041.

[5] Swifts and Hummingbirds. By Frederic A. Lucas. Ibis, July, 1893, pp. 364–371 (with nine cuts in the text).

Shufeldt has for some time contended that while Swifts and Hummingbirds have some superficial resemblances, they are in no way closely related, and should constitute two separate suborders, and that the Swifts are in reality only highly modified Swallows. In 'The Ibis' for January, 1893, he has presented his evidence anew and discussed the subject at length. In the following number of 'The Ibis' (July, 1893) Mr. Lucas has presented at moderate length the counter-evidence, taking apparently well-founded exceptions to a number of Dr. Shufeldt's propositions. In this connection Mr. Lucas objects to "sweeping generalizations based on the examination and comparison of a limited number of local forms and the assumption that certain questions have been definitely answered when we are really just beginning to gather in the facts that shall make such answer possible."—J. A. A.

Ridgway on New Birds from Mexico and the West Indies.—Mr. Ridgway has recently described two new subspecies of *Basileuterus rufifrons* from Mexico,[1] namely, *B. r. jouyi*, from San Luis Potosi, and *B. r. dugesi* from Guanajuato, western Mexico. Also a new species of *Odontophorus* (*O. consobrinus*) from Mirador, southern Mexico,[2] allied to *O. guttatus*. Mr. Ridgway has also described two new Swifts,[3] one, *Chætura lawrencei*, from Grenada, West Indies, the other, *Cypseloides cherriei*, from Costa Rica. The first is allied to *C. guianensis* Hartert, and belongs to the *C. cinereiventris* group, to which Mr. Ridgway considers both must be referred as subspecies of *C. cinereiventris*. The *Cypseloides cherriei* finds its nearest relative in *C. brunneitorques*.—J. A. A.

Stejneger on Japanese Birds.—Dr. Stejneger has recently made two additions[4] to the Japanese avifauna, one being *Tringa temminckii* (Leisl.), from the neighborhood of Tokyo, the other *Acanthopneuste ijmæ* sp. nov., from Seven Islands, Japan, allied to *A. coronatus*. He has also published a short paper[5] on a specimen of Gray Shrike from Yezo, which he refers to *Lanius sibiricus* (Bogd.), and incidentally considers the relationship of *L. borealis* and *L. sibiricus* to *L. excubitor*, regarding

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1 Descriptions of Two New Forms of *Basileuterus rufifrons*, from Mexico. By Robert Ridgway. Proc. U. S. Nat. Mus., XV, p. 119.

2 Description of a supposed New Species of *Odontophorus* from southern Mexico. By Robert Ridgway. *Ibid.*, XVI, pp. 469, 470.

3 Description of two supposed New Species of Swifts. By Robert Ridgway. *Ibid.*, XVI, pp. 43, 44.

4 Two Additions to the Japanese Avifauna, including description of a New Species. By Leonhard Stejneger. Proc. U. S. Nat. Mus., XV, pp. 371–373.

5 On the Status of the Gray Shrike, collected by Capt. Blakiston, in Yezo, Japan. By Leonhard Stejneger. *Ibid.*, XVI, pp. 217, 218.

them all as distinct species, contrary to the recently expressed opinion of Mr. Dresser (Ibis, 1892, pp. 374-380).—J. A. A.

Food Habits of Birds.—The Annual Report of the Chief of the Division of Ornithology and Mammalogy of the U. S. Department of Agriculture for the year 1892[1] contains, besides Dr. Merriam's account of the work of the Division for the year, a paper by Mr. Walter B. Barrows on 'Economic Ornithology' (pp. 193-200), which includes, besides a general statement of the progress of the work, a report on the 'Food of the Horned Larks (*Otocoris*)' by Mr. Barrows, and a report on the 'Food Habits of the Cedarbird (*Ampelis cedrorum*)' by Mr. F. E. L. Beal. Mr. Barrows concludes that Horned Larks are essentially granivorous, but subsist more or less on insects at all times, and that the nestlings are mainly fed with insects. There is of course no evidence of discrimination on the part of the birds between injurious and beneficial insects, but the whole amount of insect food—"9½ per cent. for the whole year"—is too small to be of economic importance. While they occasionally pick up some newly sown grain or grass seed, the loss on this account must be trifling, their food consisting mainly of the seeds of useless or noxious weeds, and they are thus clearly entitled to protection.

Mr. Beal's conclusions in respect to the Cedarbird are that 17 per cent. of its food consists of insects and that the largest proportion of insect food is taken during the season when fruit is most abundant, and that the young while in the nest are fed to a very great extent upon insect food. Among the insects eaten were several noxious species, as the elm leaf beetle and various caterpillars.—J. A. A.

Hasbrouck on 'Evolution and Dichromatism in the Genus Megascops.' —In a recent paper[2] in the 'American Naturalist' Mr Hasbrouck has attempted a solution of the problem of dichromatism in the Screech Owls of eastern North America. The paper is evidently the result of much patient labor and presents some new information respecting the distribution of the red and gray phases of this well-known bird, his facts being presented both in tabular form and graphically by means of maps. While the paper, on casual inspection, might be regarded as an interesting and in some ways a valuable contribution to the subject under consideration, a closer examination shows it to be nearly worthless, even as regards the data on which it is ostensibly based. Hence of course we can hardly share the author's confidence that we are here presented with a satisfactory solution of the problem of dichromatism as presented in our *Megascops asio*.

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[1] Report of the Ornithologist and Mammalogist for 1892. By C. Hart Merriam. Rep. Sec'y of Agriculture for 1892 (1893), pp. 181-200.

[2] Evolution and Dichromatism in the Genus Megascops. By E. M. Hasbrouck. Am. Nat., 1893, pp. 521-533, 638-649, with 5 maps.

Mr. Hasbrouck divides his paper into two parts: I. 'Relationship of Dichromatism to Evolution'; II. 'Causes and Influences.' In Part I, after giving a history of the views formerly held by ornithologists as to whether the red and gray phases were distinct species or merely two forms of the same species, the author takes up the subject of the geographical distribution of these two color phases, and the "relation of dichromatism to evolution" in the Screech Owl group. In regard to the distribution and evolution of the two phases and of the intermediate stages, he finds that "dichromatism is principally confined to the typical form of *Megascops asio*, appearing but slightly in the Florida form (*Megascops a. floridanus*), and barely reaching the Texan subspecies, *mccallii*," the western and southwestern forms of the group "remaining true to their normal color." He attempts to show, "first, that while the red, the gray and the intermediate phases are at present but individual variations of the same species —the gray was the ancestral stock; second, that from the gray bird has evolved the red, which at some future time will be recognized as a subspecies with a range peculiar to itself, and thus dichromatism is one step in the evolution of the Screech Owl, while the various phases exhibited are the transitorial stages of development of one species into another; third, that this condition of affairs is influenced by four powerful factors," two of which are temperature and humidity, "the most potent of which is temperature; fourth, that the *predominating* distribution is largely confined to the faunal divisions of the eastern United States, and as such is approaching the subspecific differentiation of the two phases; lastly, that the Darwinian theory of 'Reproduction with variation and the survival of the fittest,' is well exemplified in our common little *Megascops asio*."

In support of these various propositions he presents data to show that the gray phase is the only form along the northern border of the range of the species, and that its distribution about coincides with the boundaries of the Canadian Fauna, except that it turns abruptly southward in Minnesota and extends down to Middle Kansas. Below this is a somewhat similar belt where mixed birds occur with the gray phase predominant; while below this red birds prevail nearly to the Gulf Coast, where gray birds again begin to predominate and finally gray *only* occur over most of Florida. Red birds alone appear to be found about Washington, and over quite a belt along the Mississippi River, from about the mouth of the Missouri to the mouth of the Arkansas. An examination of his table of localities on which his generalizations, as graphically represented on his Map II, are based, however, shows that the observations are far too scanty to render it at all certain that these sweeping conclusions are well grounded. For instance, only one to three localities are mentioned respectively for such large areas as Alabama, Arkansas, Connecticut, Georgia, Maine, Michigan, Minnesota, Mississippi, Nebraska, New Hampshire, New Brunswick, South Carolina, and Tennessee. The whole number of localities is only 120, and in several instances quite a number of them are included within comparatively small areas. This shows how slender is the basis for a

map, covering the whole United States and southern Canada east of the 100th meridian, with sharply defined areas of distribution for "Gray birds *exclusively*," "Gray birds predominate," "Red birds predominate," and "Red birds *exclusively*." These apparently hard-and-fast areas, as seen on the map, are thus to a very high degree obviously hypothetical and untrustworthy, and are alone sufficient to show the unscientific character of the author's methods.

Not only are the facts given exceedingly insufficient, but to some extent needlessly so, since he appears to have made very little use of the literature available on the subject. But what is worse, both his text and his Map II grossly misrepresent the facts in the case, as already on record before his paper was prepared. For instance, Mr. Ridgway has stated (Birds of Ill., p. 417) that in the vicinity of Washington the two phases both occur, "although the rufous style is perhaps the more common," being in "about the same proportion" as obtains "in the neighborhood of Cincinnati," where out of 56 specimens reported on by Dr. Langdon, "32 were rufous and 24 were gray." Yet only red Owls are given in Mr. Hasbrouck's table of localities as occurring about Washington. Also no red birds are reported from Florida, and the map shows that the region of "Gray birds exclusively" includes all of Florida except its extreme northeastern portion. We have, however, seen a number of red birds from the Indian River region and southward, and Mr. W. E. D. Scott informs us that in various parts of south Florida visited by him the two phases were in nearly equal proportions, and that near Fort Thompson he found the red prevailing almost to the exclusion of the gray. Mr. C. J. Maynard, after a long experience in southern Florida, says (Birds of East. N. Am., p. 271) "both plumages are found equally common, both North and South," and that he has "found all the stages [red, gray and intermediates] as common there [Florida] as in Massachusetts." Furthermore, the type specimen of the Florida Screech Owl (subsp. *floridanus*) was a *red* bird from the Indian River! (*Cf.* Ridgway, Bull. Essex Inst., V, p. 200, and N. Am. Bds., III, p. 52.) It may also be added that Mr. Wayne, in the present number of 'The Auk' (p. 337) in a paper on the 'Birds of the Suwanee River,' says of the Florida Screech Owl: "Resident. All I examined were in the red phase."

Whatever basis Mr. Hasbrouck may have had for giving only gray birds from northern New England, northern New York, and the eastern Provinces of Canada, only *three* localities are cited by him for the whole area of Nova Scotia, New Brunswick and Maine combined, and the two from New Hampshire are both near the southern border of the State. Feeling sure of the frequent occurrence of the red phase of the Screech Owl in northern New England, we addressed a letter of inquiry on the subject to Mr. A. H. Verrill of New Haven, Conn., son of Prof. A. E. Verrill, the eminent zoölogist, formerly of Oxford County, Maine, and have received the following: "In reply to your question as to whether my father ever found the red phase of the Screech Owl in Maine, he says that he has

taken it there, but it is much rarer than the gray. I have taken both phases in New Hampshire and Vermont, but found the *red* the commoner in the White Mountains, and the *gray* the commoner in Vermont. In the vicinity of New Haven the gray phase outnumbers the red by about two to one, that is, so far as my experience goes, and I have about 50 specimens brought to me each year to be stuffed." Further comment on this part of the subject is unnecessary. The foregoing sufficiently shows the untrustworthy character of the author's generalizations respecting areas of "exclusively *gray*" birds

His methods are further illustrated in his tables showing the color of the young in relation to the color of their parents. From these tables he says, "It will be readily seen that red birds breed either all red, all gray, or both; that reds and grays breed either all red, all gray, or both; while gray birds, as previously stated, *invariably breed true*," or always produce gray birds. This last statement is not improbable, perhaps, but 'highly important if true.' So we naturally enquire as to the evidence, and find it based on apparently *six observations*. Turning to the next table, of 'Young produced by Red Parents,' out of 19 cases we find red birds produced "all gray" young in two instances, "all red" in eight cases, and mixed progeny in nine cases. In the third table of 'Young of Gray and Red Parents,' in 12 cases three gave all gray young, four all red, and five mixed broods. On this evidence the author claims that "the grays breed true even in a region where red is the predominating color, *and where the individuals in question may themselves be the offspring of red parents*," and that "gray birds *never* produce red." On this basis it is claimed that the gray birds are "the ancestral stock, and that the producing of gray birds by red parents is a tendency to revert to ancestral characters"; that the red bird is being gradually evolved as a subspecies from the gray bird, and will in time have a distinct and exclusive habitat of its own. While these facts may point to his conclusions, they seem hardly to satisfactorily establish the assumption that "gray birds *never* produce red."

The "four distinct causes" operating to produce all this are: (1) Humidity; (2) Temperature; (3) Acquired characters; (4) Forest areas. Curiously enough, he seeks to correlate the distribution of gray birds with regions of greatest humidity, forgetting apparently that over all the more arid parts of the continent all the birds of the *Megascops asio* group are gray! Again, curiously, he considers the red phase the light-colored type and the gray phase the dark-colored form. Yet with all this he has to confess that the distribution of the several color phases, even as he gives it, fails to conform to the distribution of humidity, or even to the pine forest areas, with which he thinks the habitat of the gray phase ought to agree.

In treating of the influence of temperature he singularly misquotes Verrill and Allen as stating that temperature is the "most potent of all influences in the distribution of color," a statement they not only never made, but in all probability never dreamed of making. If Mr. Hasbrouck will make the slight change of substituting the word *species* for the word

color he will correctly state what they did say. Yet his whole argument on the temperature question hinges on this misstatement.

Under 'Influence of acquired Characters,' his 'Table showing relation of color and sex' has obviously no relevancy, at least in the generalized form in which it is presented. Under 'Influence of Forest Areas' an attempt is made to show "why the gray form is not fitted for those regions in which the red is now so greatly in the majority," but the most we get is a statement that there is a partial coincidence between the distribution of the color phases of the Screech Owl with that respectively of the deciduous and coniferous forests. The main point brought forward is that "coniferous forests in the eastern part of the United States have a grayish cast," and that "where the general aspect of the forest growth is gray, gray birds are found." But that there is not a very close agreement between the distribution of coniferous forests and gray birds even our author has to lament: yet this it seems is fortunately but a slight misfortune for the theory, for if the agreement is not close it ought to be, and possibly in time will be. In fact, so crude and unphilosophical are the author's processes that it is almost difficult to treat his struggle with the Screech Owl question seriously. If he had limited his paper mainly to the presentation of his facts on the distribution of the color phases, which are valuable so far as they go, and had been content to plot them on the map by means of symbols, thus showing just how much they were worth and nothing more, he would have produced a creditable paper and saved lumbering up the literature of ornithology with matter not only practically worthless, but, what is worse, absolutely misleading to those who accept it for what it purports to present; and particularly is this true of his 'Map II.' It is in fact its pernicious and misleading features, masked under headlines and embellished with tables and maps of seemingly scientific character, coupled with the fact of its appearance in a reputable scientific journal, that have called down upon it so extended a notice in the present connection.—J. A. A.

Cook's 'Birds of Michigan.'—Professor Cook has done good service to the cause of ornithology through the publication of his 'Birds of Michigan,'[1] prepared and published under the auspices of the Michigan State Board of Agriculture. It is compiled partly from previously published lists, partly from "the valuable manuscripts of the late Dr. H. A. Atkins," and partly from his own observations and those of his students and numerous local observers throughout the State. It appears also that a rough draft of the list was submitted to various prominent ornithologists for revision and comment, with the result of giving by far the most complete and trustworthy list of the birds of Michigan that has thus far appeared.

The list was compiled to meet an urgent need of a carefully prepared catalogue of the birds of the State which should not only give a list of the

[1] Birds of Michigan. Illustrated. By A. J. Cook. Michigan Agricultural Experiment Station, State Agricultural College, Zoölogical Department, Bulletin 94, April, 1893.—8vo., pp. 148, with numerous cuts in the text.

species but also notes on their food and nesting habits, with special reference to "the economic importance of the various species." This 'Bulletin,' like the others of the Michigan Agricultural Experiment Station, is distributed "free to all newspapers in the State, and to such individuals interested in farming as may request it." It is thus intended to be educational in a broad sense. While, unlike several other recent State publications on ornithology, it does not attempt to give descriptions of the species, it contains numerous excellent illustrations of prominent types of most of the leading groups, taken (with permission of the publishers) from Dr. Coues's well-known 'Key to North American Birds.' While perhaps scarcely a model in point of literary execution, it contains a vast amount of information especially valuable to the people of Michigan, and much that is of interest to ornithologists at large, particularly as regards the distribution of a large number of species within the State.

The number of species attributed to the State is 332, but of these a number are admitted provisionally, and with expressions of doubt as to their actual occurrence. The list is thus not a hard-and-fast list of birds strictly known to have been taken in the State, but includes a number of improbable records, as notably the six species of Alcidæ. It would have been better to have excluded all such from the main list and to have made of them a separate, tentative list. Yet, as the alleged evidence is always given 'for what it may be worth,' the real facts in the case are apparent. In the 'Introduction' 21 other species are mentioned as having been recorded from Michigan, but upon unsatisfactory evidence. Yet several of them are as likely to occur as stragglers as are a number of the doubtful ones which are retained and formally enumerated as a part of the list.

In the quite extended annotations there is often much reiteration, and not unfrequently statements by different authorities that are directly contradictory, which must be the source of some bewilderment to the inexperienced student.

The list proper is preceded by a transcript of all the Michigan game laws relating to birds, and by a very full bibliography of Michigan ornithology, the latter alone occupying 14 closely printed pages; there is also a full index giving both the vernacular and technical names. As already said, the work is well adapted for the chief end in view, and is besides a welcome contribution to the literature of North American ornithology.— J. A. A.

Averill's List of the Birds of Bridgeport, Conn.[1]—Mr. Averill's List is "intended to include all species of birds known to occur in a wild state within ten miles of Bridgeport." Many species are admitted from Linsley's well-known 'Catalogue of the Birds of Connecticut,' as recorded from

[1]List of Birds | found in the vicinity of | Bridgeport, Connecticut. | — | Prepared for the | Bridgeport Scientific Society | by | C. K. Averill, Jr. | — | January, 1892. | — | Bridgeport, Conn.: | Buckingham & Brewer, Printers. | 1892.—8vo., pp. 19.

Stratford, and several others are taken from Dr. Merriam's 'Review of the Birds of Connecticut,' on the basis of their known occurrence at Milford. In the main, however, the List is based on the author's own observations, and those of a few fellow-observers, whose names are given in the List. The writer says that "no species has been admitted on unreliable evidence," and a careful examination of the List indicates that it has been prepared with excellent judgment and great care. The number of species recorded as actually known to occur in the immediate vicinity of Bridgeport is 246, all of which are briefly annotated, explicit data being given for the more notable rarities.—J. A. A.

Summer Birds of Greene County, Pa.—Mr. J. Warren Jacobs has just issued a carefully annotated list[1] of the summer birds of Greene Co., Pa. The list gives about 90 species as breeding in the county, and several others are mentioned as found there during the breeding season. The author says he has "aimed to give a correct list of birds found during the breeding season, and to describe, briefly, the localities frequented by the birds, and to state, where sufficient data has been gathered, the nesting date and the number of eggs composing the complement." Greene County, Pennsylvania, is situated in the extreme southwestern corner of the State, and includes an area of about 600 square miles, the elevation nowhere much exceeding 1200 feet. The list thus relates to a region of which we previously knew little except inferentially, and being restricted to the breeding season, gives most important information respecting the character of its fauna. A similar list for almost any locality south of the latitude of the Ohio and Potomac Rivers, and east of the Plains, would be a most welcome addition to our knowledge of the breeding ranges of many species of our birds, and form a valuable contribution to faunal literature.—J. A. A.

Nutting's Zoölogical Explorations on the Lower Saskatchewan River.[2]—Mr. Nutting's 'Report' of nearly 60 pages records the results of two months' work, in July and August, 1891, by himself and Messrs. Frank Russel and A. G. Smith, on the Lower Saskatchewan River. Although general collections were made, mammals and birds received particular attention, 38 pages of the 'Report' being devoted to birds (pp. 247–286). Besides an annotated list of 104 species,—all taken between July 6 and August 25, and hence assumed to be "summer residents,"—several pages are devoted to a discussion of the cause of migration, and several

[1] Summer Birds | of | Greene County, | Pennsylvania. | By | J. Warren Jacobs, | Waynesburg, Pa. | — | Waynesburg, Pa., | — | Republican Book and Job Office. | — | 1893.—8vo., 15 pp.

[2] Report on Zoölogical Explorations on the Lower Saskatchewan River. By C. C. Nutting. Bull. Labratories of Natural History of the State University of Iowa, Vol. II, No. 3, Jan. 1893, pp. 235–293.

more to a tabular list of the species observed with reference to their distribution over other parts of the continent. In seeking a cause other than "instinct" for the migratory movement in birds the author holds that the impulse to migrate "comes in the shape of a stimulus *from without* and the act is a *conscious* seeking for a more suitable clime, on the part of the adults at least, the young simply following or imitating their elders." He adds: "There is much to indicate that this stimulus comes in the form of *wind*"; a warm southerly wind in spring will bring the birds north, and a "cold windy night in the fall will bring the birds south," etc.

A perusal of the list renders it evident that not all of the 104 species observed were strictly "summer residents," but that among them are many more properly to be classed as early fall migrants, the field of observation not being reached till the breeding season of many species was nearly over, and but little before the early migrants normally begin to move more or less southward. Unfortunately the dates of the actual capture of specimens are rarely given, nor are even the localities definitely indicated. The list, however, abounds with many interesting observations.—J. A. A.

A New List of Chilian Birds.[1]—The present list, compiled by the late Mr. H. B. James after a long residence in Chili, "contains only what the authors believe to be species that have been positively identified as occurring in Chili, and omits all those that are doubtful, or that have been erroneously introduced into previous lists. It includes in its scope all Chili, from the newly-acquired Province of Tarapacá on the north to Chiloe on the south, but not the territory of Magellan." The list is mainly a nominal one, consisting of the technical names, and the vernacular when known, with abbreviations indicating whether the species is a permanent resident or merely a winter, summer, or occasional visitor, as the case may be. Those occurring only in Tarapacá, or on the Islands of Juan Fernandez and Masafuera have these localities appended. The total number of species given is 255, a number surprisingly small considering the extent and character of the country.

Dr. Sclater gives in his preface a short biographical sketch of the author, from which it appears that Dr. Sclater and Mr. James had formed a plan to prepare jointly a work on the Birds of Chili as a sort of companion volume to that on 'Argentine Ornithology,' by Sclater and Hudson. It is greatly to be regretted that the death of Mr. James on the 22d of July, 1892, is likely to prevent the consummation of so desirable a scheme.—J. A. A.

[1] A New List | of | Chilian Birds | compiled by the late | Harry Berkeley James, F. L. S., F. Z. S., F. R. G. S. With a Preface | by | P. L. Sclater, M. A., Ph. D., F. R. S. | - | Printed for Private Use. | -- | London: | Printed by Taylor and Francis, | Red Lion Court, Fleet Street. | 1892. | Roy. 8vo, pp. viii, 16.

Berlepsch and Peters on Birds from Curaçao.[1]—Having received a number of birds collected on Curaçao by Herr Peters, Graf von Berlepsch has made this collection the basis for an extended review of the relationships of the birds of this island. A synopsis of the previously existing literature referring to the avifauna of the island is followed by analyses of the birds found there, which show their continental and West Indian affinities. In explanation of the singular distribution of *Conurus pertinax*, found only on Curaçao and St. Thomas, it is suggested that the bird may have been introduced on the latter island, a not unreasonable supposition.

The nineteen species given from the island are very fully annotated. *Cœreba uropygialis*, *Buteo albicaudatus colonus*, and *Falco sparverius brevipennis* are descibed as new. The list is concluded by a synoptical table which readily shows the distribution and relationships of Curaçaon birds.

Herr Peter's field-notes refer to fifty-one species of which only eighteen are represented in the collection.—F. M. C.

Hartert on Birds from Aruba, Bonaire and Curaçao.[2]—A revolution having prevented Mr. Hartert from visiting Venezuela, as he proposed doing on his recent trip to South America, he turned his attention to the small islands of Aruba, Bonaire, and Curaçao off the Venezuelan coast. The restricted fauna of these islands is of course less attractive to the collector than the rich life of the mainland forests, which is doubtless the reason, as Mr. Hartert states, for their comparative neglect by naturalists. We may be thankful, therefore, that they have at last been thoroughly explored by an experienced collector. The results of this exploration have in part been announced in the Bulletin of the British Ornithologists' Club for 1892 and 1893, where *Euethia sharpei*, *Myiarchus brevipennis*, *Conurus arubensis*, and *Amazona rothschildi*, all slightly differentiated insular forms, were described. To these *Columbigallina passerina perpallida* is now added, and a plate of *A. rothschildi* is given.

Aruba, sixteen miles from Cape San Roman, is the nearest of the three islands to the continent. Mr. Hartert gives a list of twenty two land-birds and eighteen water-birds as a result of his observations in this island. *Amazona canifrons* (Lawr.) from Aruba is considered to have been based on an example of *A. ochroptera* (Gm.) "with a dirty forehead." A plate is given of the latter species. Mr. Hartert states that in *Icterus xanthornus curasaoensis* the black tail is assumed "by changing colour, not by moult, as two of my specimens clearly show." It is to be regretted

[1] Die Vögel der Insel Curaçao nach einer von Herrn Cand. theol. Ernst Peters daselbst angeleten Sammlung bearbeitet von Hans von Berlepsch. Journ. für Orn., January, 1892, pp. 61-104. Die Vögel Curaçaos. Nach meinen Journalnotizen vom 21. August bis 5. Sept. 1890. Von Ernst Peters Th. C. *Ibid.*, pp. 104-122.

[2] On the Birds of the Islands of Aruba, Curaçao, and Bonaire. By Ernst Hartert. Ibis, July, 1893, pp. 289-338, pll. viii, ix.

that he did not describe these two specimens which "clearly show" what large series of specimens of allied species have previously failed to prove.

From Curaçao Mr. Hartert records twenty-eight species of land-birds and eleven of water-birds, being all that have been identified with certainty from this island.

The relationships of the *Euethia bicolor* group are here discussed at length, and four forms are recognized,—*bicolor*, from the Bahamas and Lesser Antilles; *marchi* from Jamaica, San Domingo and Barbados [?]; *sharpei* from Aruba, Curaçao, and Bonaire, and *ommisa* from Colombia, Venezuela, and Tobago.

Bonaire, the third island to be visited by Mr. Hartert, is described as the "most oceanic of the three" and "generally more wooded than the other three." Twenty-three species of land-birds and fifteen species of water-birds were found on this island. The occurrence here of the West Indian *Margarops fuscatus* and *Ammodramus savannarum* is among the most interesting of Mr. Hartert's discoveries.

He concludes by calling attention to the "striking affinities between the avifauna of these islands and that of the islands of St. Thomas and St. Croix (Virgin Islands), but no similarity to that of the Windward Islands." These facts, Mr. Hartert thinks, "seem to point to the theory that the Virgin Islands and the Islands of Bonaire and Curaçao were formerly connected in some way, or that they are of the same geological age, and not of the same age as the Windward Islands." He adds: "Perhaps there was once a line of islands (similar to that of the Lesser Antilles) reaching from St. Thomas through 'Los Aves,' or the Bird Island, by way of Blanca, Orchilla, Grand Cay, Los Roques, and the second group called 'Los Aves,' to Bonaire and Curaçao." It seems to us, however, that the facts of the case are too unimportant to justify Mr. Hartert's reckless island-building in the great depths of the Caribbean Basin. The islands off the Venezuelan coast are oceanic and their avifauna like that of most oceanic islands is in part due to purely fortuitous circumstances. Accidental visitors which would stand little chance of surviving in more thickly populated regions here find an isolation favorable to their existence. Their presence is thus not necessarily to be accounted for by actual geographical connection with the habitat of their nearest allies. Again similar causes may produce similar results. The Bahaman *Geothlypis* finds its nearest relative in the Lower Californian species, but there is no reason to doubt that it was derived from the Florida form from which it has changed in the direction of the western species. Most of the West Indian species occurring on Aruba, Bonaire, and Curaçao are found as slightly differentiated races in the Windward Islands, and it is quite possible that some of them have been derived from this source and subsequently have become changed to forms more closely resembling those found in the Virgin Islands.

Furthermore, as oceanic islands of apparently great age (Mr. Hartert suggests that they may be older than the Windward Islands), it is not

improbable that these small islands, like the West Indies themselves, should now have species resident upon them which were originally derived from the mainland where they have since yielded to the continental struggle for existence and given place to better adapted forms. *Margarops* on Bonaire is a case in point; *Spindalis* on Cozumel is perhaps a similar instance.—F. M. C.

Newton's Dictionary of Birds, Part I.[1]—The scope of this highly useful and important work is thus defined by its principal author: "Those who may look into this book are warned that they will not find a complete treatise on Ornithology, any more than an attempt to include in it all the names under which birds, even the commonest, are known. Taking as its foundation a series of articles contributed to the ninth edition of the 'Encyclopædia Britannica,' I have tried, first, to modify them into something like continuity, so far as an alphabetical arrangement will admit; and, next, to supplement them by the intercalation of a much greater number, be they short or long, to serve the same end. . . . In the difficult task of choosing subjects for additional articles, one of my main objects has been to supply information which I know, from enquiries often made of me, to be greatly needed." The selection of names to be inserted, says the author, has been quite arbitrary, such compound names as Crow-Shrike, Crow-Titmouse, Shrike-Crow, Titmouse-Thrush, and the like, having been excluded, as well as "a vast number of local names of even British Birds," while such names as Caracara, Koel, Mollymawk, Tomfool, etc., which occur more or less frequently in books of all sorts, but especially in works of travel, are included. Those of course who are familiar with the character of the ornithological matter in the 'Encyclopædia Britannica' need not be told that the work is not made up simply of bird names and their definitions, but includes the whole range of ornithology, embracing the anatomy of birds, their classification, their geographical distribution and much purely biographical matter, as will be noted later.

In respect to the authorship of the work, we are told that the anatomical portions are mainly contributed by Dr. Gadow, and that they bring, in the opinion of the principal author, "the anatomical portion to a level hitherto unattained in any book that has appeared." "For other contributions of not less value," says Professor Newton, "I have to thank my old pupil Mr. Lydekker, my learned colleague Professor Roy, and my esteemed correspondent Dr. Shufeldt, formerly of the United States Army."

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[1] A Dictionary of Birds. By Alfred Newton. Assisted by Hans Gadow. With Contributions from Richard Lydekker, M. A., F. G. S., Charles S. Roy, M. A., F. R. S., and Robert W. Shufeldt, M. D., late United States Army. Part I (A-Ga). London, Adam and Charles Black, 1893. 8vo., pp. viii, 304, map, and numerous illustrations in the text.

In regard to the arrangement and character of the matter, it may be noted that the higher groups, as orders and suborders, are treated formally but briefly in their alphabetical sequence, but we look in vain for a similar treatment of genera or even families, at least under their technical names, such groups being generally entered under their English names, although there are some exceptions, as in the case of *Chamæa*, *Cereopsis*, etc. Thus while we find Amazon, Ani, and Bittern, we look in vain for *Chrysotis*, *Crotophaga*, and *Botaurus*. In respect to English names, we have something about their origin, etymology, and cognate equivalents in other modern languages, with usually some account of the bird or birds to which the name is applied, varying in extent from a few lines to several pages. Thus under *Accentor* we have three lines, stating that the name was used by Bechstein for a genus of Sylviidæ, and that "some British authors have tried with small success to add [the name] to the English language"; while some three pages are given to *Albatross*, nearly two each to *Avocet*, *Bittern*, three to *Crane*, six to *Dodo*, etc., usually with one or more cuts under each. Under *Bob-white*, we are told that it is "a nickname of the Virginia Quail, *Ortyx virginianus*, aptly bestowed from the call-note of the cock," with no hint that the name has been adopted of late as the regular 'book-name' for not only this species but all its congeners by American writers generally. In respect to this phase of the work, the exacting critic might discover much to find fault with, even from the supposed standpoint of the author, but we should perhaps rather be thankful that so much useful and pertinent information has been selected for presentation from a field so wide and inviting that the difficulty is to keep the matter within reasonable limits.

The anatomical side of the subject is treated with much fullness, and for the most part satisfactorily, so far as the limits of the volume will permit. It is to be noted, however, that Dr. Gadow's complete belief in the great efficacy of 'sexual selection' as an agent in evolution is manifested without reserve or check, as shown especially in his article on *Colour*, where he says: "Natural and sexual selection, whether combining or striving against each other, have worked marvels in plumage. Significant colours, as for instance total blackness or whiteness, could be developed only when higher intellectual qualities, bodily size and strength, or occasionally even special smallness, guaranteed the safety of the bird." With such elasticity in premises, it is little wonder that explanations seem easy, although we have white and black birds of all orders and of all sizes, and living amid the most diverse surroundings. He observes further that "The very early assumption of the black plumage by the nestlings of Ravens and Crows is a strong argument for their relatively highest position on the hypothetical avine tree." It would be interesting to know what evidence Dr. Gadow can advance for the intellectual superiority of Crows and Ravens over Magpies and Jays.

The article on color is, however, a most useful one, as it gives in a condensed and intelligible form a general summary of our present knowledge of the subject, including the nature and kinds of color pigments, 'objec-

tive structural' colors, and 'subjective structural,' prismatic, or metallic colors. Respecting the distribution of coloring matter he says: "To judge from the growth of a feather, the production of crossbars seems to be the older stage, since they will result from the intermittent deposition of pigment, while, on the other hand, the production of shaft-streaks is not yet satisfactorily explained. At any rate, it must be borne in mind that possibly various groups of birds have gone independently through such stages, and that what is primitive or archaic in one need not be so in all."

It seems strange not to find under *Dimorphism* some reference to the familiar phenomenon of dichromatism as exemplified in numerous genera of Owls, Hawks, Goatsuckers, Herons, etc., some of which seemingly should have come to his mind in this connection rather than the far-fetched cases he does cite. In fact, it would seem only fair to expect that a subject of so much importance and interest as dichromatism would at least receive mention, if not be made even the subject of a short article.

Among other subjects treated at considerable length are *Eggs*, by Newton, forming an article of 10 pages; *Embryology*, by Gadow, 18 pages; *Extermination*, by Newton, 12 pages; *Feathers*, by Gadow, 10 pages; *Flight*, by Prof. Roy, 12 pages; *Fossil Birds*, by Lydekker, 8 pages. These are all articles of the highest interest and importance, though that on Flight is somewhat disappointing, both in method of treatment and results. For instance, the relation of flight to the form of the wing is given much less consideration than its importance merits; and there is a tendency to treat the subject, and particularly soaring, from the standpoint of the physicist and the mathematician. The fact seems to be ignored that a bird is not a dead weight—a piece of card board, or a lump of dead matter—but a living, sensitive, highly endowed animal.—a living kite, to employ a simile, in which the attraction of gravitation represents the kite-string, while the soaring bird, representing the kite as a whole, under the direction of its keen senses, is constantly, automatically perhaps or at least almost unconsciously, trimming its sails—its wings and tail—to secure its desired course or position. Any one who has observed birds soaring under a variety of circumstances need not be told that while "upward currents of air" and "varying velocity of wind at different altitudes" may be necessary for soaring in the opinion of the physicist, birds themselves are not thus restricted, at least to any essential degree. A certain amount of momentum must evidently be acquired, after which birds seem able to soar at pleasure in either a practically calm atmosphere or in a gale of wind; within a few yards of the surface of the earth or at altitudes almost beyond the reach of the vision. A slight, even almost imperceptible movement of a wing or inclination of the tail may suffice to place the bird in the proper plane to receive a new impetus or enable it to radically change the direction of flight.

Much of the 'Dictionary,' as already explained, is matter republished with little change from the 'Encyclopædia Britannica,' but there is a great deal that has been expressly written for the present work. The illustra-

tions are a prominent and useful feature, and include a very large number of excellent wood-cuts, from Swainson's 'Classification of Birds,'—figures, which for "truth of detail and beauty of design have seldom been equalled and rarely surpassed."—J. A. A.

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Sharpe, R. B. (1) Note on *Irrisor jacksoni*, sp. n. (Ann. and Mag. Nat. Hist., Dec. 1890.) (2) Notes on a second Collection of Birds made by Mr. W. D. Cumming at Fao, in the Persian Gulf. (Ibis, Jan., 1891.) (3) Descriptions of fourteen new Species of Birds discovered by Mr. F. J Jackson in Eastern Africa. (Ibis, Jan., 1892.) (4) Diagnoses of new Species of Birds from Central East Africa. (Ibis, July, 1891.) (5) Descriptions of new Species of Birds discovered by Mr. C. Hose on Mount

Dubit, N. W. Borneo. (Ibis, April, 1893.) (6) On a Collection of Birds from Mount Dubit. in Northwestern Borneo. (Ibis, July, 1892.) (7) Descriptions of some new Species of Timeliine Birds from West Africa. (P. Z. S., 1892.) (8) On birds collected in Pesak. (Repaged separate, without indication of source.) (9) The Ornithological Work of J. S. Jameson. (Separate from 'Story of the Rear Column.') (10) On the Zoö-Geographical Areas of the World, illustrating the Distribution of Birds. (Natural Science, Aug., 1893.)

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Zoölogist, July–Sept., 1893.

GENERAL NOTES.

Capture of the Black-capped Petrel Inland in Virginia.—The little town of Blacksburg, in Montgomery County, Virginia, beyond the Blue Ridge, and about 2150 feet above the sea, is distant from the coast about two hundred miles. Yet here, on August 30, 1893, two days after the great cyclone, I obtained a bird, the capture of which would be well worthy of note if made anywhere on the coast of the United States. A negro brought me, confined alive in a shoe box, a bird which he had captured on a small fish pond that day; the bird could scarcely fly, and he had caught it by hand. I recognized it as one of the Procellariidæ, but its large size and stout, strongly hooked beak brought to my mind only vague visions of

Daption. Dr. Coues's 'Key,' backed by Ridgway's 'Manual,' soon settled its identity beyond question, and now henceforth the Black-capped Petrel, *Æstrelata hasitata* (Kuhl), ranks as a Virginia bird, although an estray.

The measurements were as follows: extent, 39⅜ inches; length, 15½; wing, 11¾; tail, 5 1/16; gradation of tail, about 1.75. Further measurements or description were simply to repeat Coues or Ridgway. The beak was as represented by Ridgway, only the nostril tube was nearly straight, and not so convex as shown by that author. Tongue and inside of mouth, of a fine purplish cast. The stomach was empty, save for slime which was evidently secretion, as it showed no organic structure on microscopic examination. The skin was totally devoid of the usual sea-bird fat, and the whole bird was remarkably lean. The patella showed the same remarkable spiny development which I have noticed in *Puffinus audubóni*. The moult was almost complete, the first and second primaries in each wing being still old and worn feathers. Unfortunately the bird died before I could photograph it alive, and the accompanying photographs[1] were taken from the bird 'in the meat,' just before skinning it. I also made careful drawings of beak, humero-coracoidal, and tibio-femoral joints.

Considering the species, I believe this to be a remarkable occurrence of a 'sea-stray' inland, and it goes to show something of the character of the cyclone of 1893.—Ellison A. Smyth, Jr., *Blacksburg, Va.*

Fregata aquila in California.—A Man-o'-war Bird was shot at North Pasadena in 1892, by a man named Lincoln Price. The specimen was mounted by Mr. W. H. Wakeley of Pasadena. Mr. Price tells me he shot it about sunset on a fair day about a year ago [*i. e.*, about August, 1892]. The bird was circling about rather low; and once seemed inclined to alight on a gum tree, but did not. The bird is an immature one. It is now in a Los Angeles drug store. This record is interesting for this State, for it seems that the only previous well authenticated record for California was from Humboldt Bay, October 5, 1888 (see Anthony in Proc. Cal. Acad. Sc., Vol. 2, p. 88).—R. H. Lawrence, *Duarte, Cala.*

The Cinnamon Teal (*Anas cyanoptera*) in Florida.—During a visit to Mr. John Krider's old gun store in this city last winter the taxidermist showed me a fine specimen of a male Cinnamon Teal, still in the flesh, which he said had just been received from South Carolina to be mounted. As the gentleman who shot it, Mr. Charles S. Hebard, was likely soon to return from the south I made no further inquiries as to the capture until I could see him personally. As he did not return, however, I secured his address and received the following reply to a request for particulars. Writing under date of Pequaming, Baraga Co., Michigan, Aug. 14, 1893, he says: "I shot the Cinnamon Teal on Lake Iamonia in Florida about five days before it reached Krider's. I cannot give the date but suppose

[1] The photographs, on comparison with a mounted example of *Æstrelata hasitata* from the coast of Florida, show the above identification to be beyond reasonable doubt.—Edd.

they can at Krider's. Mr. Kerr and I were shooting Snipe, and while crossing a bottom with weeds all over it and water about fifteen inches deep, I started this Duck from a small pond. It was alone. When I got to where it fell I was struck by its beauty and decided to have it mounted. The bird is mounted in dead game style." According to Mr. Hebard's calculation the bird was killed on February 18, 1893.

Mr. W. E. D. Scott records in 'The Auk' (Vol. VI, p. 160) specimens of Cinnamon Teal taken at Key West, and Dr. J. A. Allen mentions (Bull. Mus. Comp. Zoöl., Vol. II, p. 363) on the authority of Mr. Maynard that examples of the same species have been taken on the Indian River.—SAMUEL N. RHOADS, *Philadelphia, Pa.*

An Additional Specimen of the Labrador Duck.—The Academy of Natural Sciences of Philadelphia was recently presented with the natural history collections of the late George W. Carpenter of that city. The collections, which included a great number of mounted birds, were arranged in a separate museum building on the grounds of the Carpenter estate at Mt. Airy near Philadelphia, which forty or fifty years ago was one of the most famous private museums in the State and was visited by Mr. Audubon and other naturalists of note.

Upon examining the birds contained in the collection in May of the present year, preparatory to having them removed to the Academy, I was delighted to discover an adult male of the Labrador Duck (*Camptolaimus labradorius*) in a very good state of preservation. The bird was unfortunately without any label except a number referring to a catalogue which had been lost some years ago, and I was unable to obtain any information whatever concerning its capture.

This specimen (No. 30,245, coll. A. N. S. Phila.) is evidently additional to those enumerated in Mr. Dutcher's recent paper (Auk, VIII, p. 201), and together with the specimen recorded in 'The Auk' for October, 1892, (IX, 389) brings the whole number of known specimens up to forty.

The Philadelphia Academy has now a very fair representation of this species, as it previously possessed a female and two young males.—WITMER STONE, *Philadelphia, Pa.*

Capture of Another Ardetta neoxena at Toronto, Ontario.—On May 20, 1893, a female *Ardetta neoxena* was shot at Toronto Marsh by a fisherman, named J. Ramsden, and was brought to Mr. Oliver Spanner, taxidermist, who bought the bird. Mr. Spanner has it mounted, and has furnished me with the following measurements: length, 13½ inches; wing 4½ inches; and informs me that it is a female.

This is the second specimen taken at Toronto, and makes the eighth specimen known in collections, the other six having been collected in Florida, where its range appears to be very much restricted. The first specimen taken at Toronto was shot on May 18, 1891, and is recorded by Mr. William Cross in the third issue of the 'Proceedings of the Ornithological Subsection of the Canadian Institute,' for 1890–91, page 41. This

specimen was sent to Mr. Ridgway for examination, and was identified by him. The bird is at present mounted and in the collection of the Canadian Institute, Toronto.

In noting that the two birds were shot at almost exactly the same date in each year, it would appear that their habits of migrating are very regular, and that the absence of records for other years might be due to their great rarity and their retiring habits, for they certainly are very rare visitants, and possibly, as Mr. Cross says, "have wandered up here with our *Ardetta exilis*." A probably parallel case is that of the capture of an Audubon's Caracara (*Polyborus cheriway*), on the north shore of Lake Superior, not far from Port Arthur, on July 18, 1892, reported by Mr. George E. Atkinson, to the Natural History Society of Ontario; and another similar case is the taking of a Purple Gallinule (*Ionornis martinica*) near Toronto on April 8, 1892, reported by Dr. Brodie.

On comparing the two Toronto specimens of Cory's Bittern, the markings are identical, except that in the bird of 1893 there is a patch of white feathers on each leg, which is entirely wanting in the other, and that the dark under parts of the body proper in the 1893 bird are mixed with dark chestnut, while in the other this is almost entirely wanting. Dr. Coues's description agrees with each bird, excepting in the above particulars.— HUBERT H. BROWN, *Toronto, Ontario.*

[Mr. Brown has been kind enough to send me the bird above referred to for examination. On comparing it with four specimens in my collection from Florida, I find that it agrees very closely with a skin taken at Lake Flirt by Capt. Menge and referred to by Mr. Scott (Auk, IX, 1892, p. 142) under the catalogue number "11,451." The Toronto bird is a trifle the darker on the back, and the chestnut of its under parts is slightly richer, but in other respects the two specimens are almost exactly alike.— WILLIAM BREWSTER.]

Another Megascops flammeolus for Colorado.— In referring to Mr. Edwin M. Hasbrouck's article in the July 'Auk,' on 'The Geographical Distribution of the Genus *Megascops* in North America' I may say that I have a specimen of *Megascops flammeolus* which was shot July 17, 1884, in Bear Creek Cañon, near Evergreen P. O., Jefferson Co., Colorado. This swells the total of known records for the United States to seventeen, of which twelve are from Colorado.— HORACE G. SMITH, *Denver, Colo.*

The Road-runner in Kansas.— In August, 1892, Mrs. M. L. Smith noticed a strange bird about her home in Comanche County, this State. The bird was seen "every day or so," but it could not be caught. Finally, during a heavy snowstorm at Christmas time, the bird, which proves to be a Road-runner (*Geococcyx californianus*), was caught by a son of Mrs. Smith. The bird was kept in a large cage until the snow was gone and was then set at liberty. It remained about the premises, however, and "would come into the house," or would sit on a window-sill and receive its "rations," which were regularly given it until spring. The rations

comprised "fresh meat, mice, and boiled egg." In the spring (1893) "it commenced cooing, and sometimes would be gone over night. It roosted in a large outbuilding, and "for fear of losing it," writes Mrs. Smith, "we put a screen to the door and have it confined now" (May 23, 1893).

Col. N. S. Goss in his 'Revised Catalogue of the Birds of Kansas' (1886) states that two Road-runners were seen in 1884 near the western line of the State, and says: "I feel confident that they occasionally breed in the southwestern corner of the State, a natural habitat for the birds." The occurrence here noted is the only one, excepting the one referred to by Col. Goss, which has been so far recorded for Kansas.— VERNON L. KELLOGG, *Lawrence, Kansas.*

Two Corrections.— In an article which appeared in the July number of 'The Auk' I described at some length a peculiar process of regurgitation employed by the Flicker in feeding its young, believing —and indeed remarking at the time—that the habit was unknown or at least unrecorded. It seems, however, that it had been previously observed by Mrs. Olive Thorne Miller who published an account of it in 1890 in the 'Atlantic Monthly,' the article being afterwards (in 1892) republished in a collection of essays entitled 'Little Brothers of the Air.'

It is a pity that writers like Mrs. Miller—gifted with rare powers of observation and blessed with abundant opportunities for exercising them —cannot be induced to record at least the more important of their discoveries in some accredited scientific journal, instead of scattering them broadcast over the pages of popular magazines or newspapers, or ambushing them in books with titles such as that just quoted. But an opportunity for delivering a properly frank and telling homily on this sad evil is unfortunately denied me on the present occasion, for some one of these writers might be unkind enough to point the moral of a second admission which I am about to make, viz., that my announcement, in the last number of 'The Auk,' of the capture in Georgia, by Mr. Worthington, of two specimens of the Ipswich Sparrow, proves to have been anticipated in a previous issue (Vol. VII, April, 1890, pp. 211, 212) of *the same journal.* It is needless to say that this fact had quite escaped my memory—as it had also, apparently, that of our usually vigilant editors—and I was further thrown off my guard by Mr. Worthington's statement that, as far as he was aware, his birds had never been reported. This assurance—unquestionably given in good faith—affords a striking as well as amusing instance of the fallibility of human memory, for the record just cited was made by *Mr. Worthington himself.*— WILLIAM BREWSTER, *Cambridge, Mass.*

The Number of Ribs in Cypseloides. — The occurrence of a rudimentary seventh pair of ribs is so common among Swifts that I have long been looking for a species in which the normal number of ribs should be seven pairs. Apparently this looked-for species has at last been found in the western Cloud Swift (*Cypseloides niger*), for four specimens of this bird recently

examined have each seven pairs of ribs, and it seems hardly probable that these specimens, collected at different times and localities, should all be abnormal. The peculiar interest attached to the possession of seven pairs of ribs by a Swift lies in the fact that no known Passerine bird has, normally, more than six pairs of ribs, while such Hummingbirds as have been examined have eight pairs. *Cypseloides* is also peculiar in its skull, as has been pointed out by Dr. Shufeldt, the vomer not being expanded distally as in the other Cypselidæ. The Tree Swifts have a somewhat similar vomer, but these, to my mind, form a separate and well marked family, as set forth in 'The Auk' for January, 1889. — FREDERIC A. LUCAS, *Washington, D. C.*

An Attractive Addition to the Avifauna of the United States.—Icterus gularis yucatanensis von Berlepsch.— MR. E. A. McIlhenny recently sent me for identification a skin of a handsome Oriole which proves to be this subspecies and which he kindly presented to the collection of the United States National Museum here. He shot the bird on June 3, 1893, on Avery's Island, New Iberia Parish, Louisiana, from a flock of four; and he writes me that although these birds were quite tame he only shot the one in hopes that the remaining ones would bring others there. His attention was first called to them by their unfamiliar whistle, which is a soft flute-like note expressed by the word 'whae' about as well as anything; this is repeated from time to time as the birds move from limb to limb in search of food. On dissecting the specimen he found a number of small green caterpillars and several spiders, but the principal food seemed to consist of the small purple figs, which were just ripe. While in search of food they move about exactly as the Baltimore Oriole does, swinging from slender twigs head downward, looking under limbs for insects, and moving about continually. He observed the remaining three birds again on June 5 in some fig trees in the plantation garden.

Although this beautiful Oriole may be an irregular, it appears to be sometimes a common summer visitor along the Gulf coast of Louisana, and less frequently perhaps of Mississippi as well, as the following notes will show; and it seems even probable that it breeds occasionally within our borders. Mr. McIlhenny had already obtained a specimen of this Oriole two years previously and sent me the following extracts, relating to its occurrence, copied from his note-book.

"May 17, 1891. John Goffney brought me today a beautiful bird that he killed in the swamp back of the sugarhouse. It is undoubtedly an Oriole, but one I have never seen before. Owing to the poor condition of the plumage, I did not make a skin of it. The markings are: head, breast, under and upper tail-coverts, orange; wings black with orange markings at their base; back black from base of neck to upper tail-coverts. It is a male, and much larger than the Baltimore Oriole. On dissection the only food found was a few insects and three small caterpillars.

"August 3, 1892. Today I went out to Mr. Herters's rice field to try and get some of the birds I hear feed there. I met J. Mason and induced him

to go with me. We arrived there quite early and saw a flock of about twenty of the birds I was after; they were feeding on the rice in company with Bobolinks and Red-winged Blackbirds. We found them very wild and it was impossible to get a shot. The men who mind the rice told me they sometimes killed a few and they saw some every year in these fields. I went to the house of a negro who had killed some the day before, to see if I could get any, but found they had all been used for food. I saw, however, the heads, wings and feathers of several specimens and think undoubtedly that the birds are the same as the one brought me by John Goffney on May 17 of last year, that is, it is an Oriole I do not know.

"On showing the specimen killed on June 3, 1893, to Mr. Allen Mehle on the 14th of the same month, he told me that a flock of about two hundred of these birds came to his place at Mississippi City, Miss., in July, 1892, and remained there for some time. Numbers of them were killed and several were sent to a taxidermist in New Orleans, but he did not know his name. He is positive it is the same bird, and as no one knew what they were, he had some mounted."

In his letter of Sept. 12, 1893, Mr. McIlhenny writes me also as follows: "I showed the skin, before I sent it to you, to Captain Jim Hare of the Trinity Shoal lightship, and he told me that two birds of exactly the same appearance had struck the light and had been killed this spring in April. His ship is sixty miles out to sea and due south of here. Capt. Hare tells me that he often sees large flocks of small birds flying high in the air during their migrations."

From the foregoing it will be seen that this Oriole cannot be regarded as simply a straggler, and it is only surprising that it has been overlooked so long.— CHARLES E. BENDIRE, *Washington, D. C.*

Behavior of a Summer Tanager.— I send the following item which my friend, Rev. Boniface Verheyen, of St. Benedict's College, Atchison, Kansas, communicated to me a short time ago.

". . . I want to tell you about the peculiar conduct of a Summer Tanager (*Piranga rubra*) which a number of the professors witnessed daily for several weeks. It was during the last week of May that the bird first began to attract attention. He would be seen to fly from window to window on the north side of the west wing of the College, or perch on the sill, facing inward, as if peering through the window. Every few moments he would make an attack on the pane with his bill, as if he were trying to get at something or force his way through. When driven from one window he would fly to another. His attacks were at times quite vicious: he would fly from a neighboring tree directly for the window and strike the pane with a whack. Time and again he attracted my attention in my room, though the door was shut. Several times I took my stand directly in front of the closed window within a few feet of him and watched him closely at his seeming mad effort to peck holes through the pane. He did not seem to care much whether I stood there or not. I opened one of the windows on several occasions to see if he would come in, but he did

not take kindly to my invitation, for he would give the open window a wide berth. One of the junior professors, M. Stein, of your town, had better success in this particular than I had. He happened along the lower corridor, when he found the bird hammering away at the window. He watched a few moments and opened the window. Without further ado the bird flew through and lighted on the window stool; and what is singular, the bird allowed M. Stein to approach and take him into his hand. The bird was set at liberty soon after. The strange conduct of the bird excited general comment in our end of the house, and as many as six or eight professors watched his pranks at a time. It was quite a sight to watch him, so intent he was in his work, and the feathers of his neck fairly on end with the nervous tension.

"The solution of the bird's strange conduct was found one morning while we were at breakfast, when he was again laying one of his periodic sieges to the windows. From the situation of the dining room in the north wing of the building, the eye sweeps across the open court to the west wing, the north windows of which were the *point d' attraction* for the bird. It was then noticed that the light was reflected from the glass, and objects out in the court were plainly mirrored in the panes and the image of the Tanager was quite well defined. The mirror-like reflection was particularly strong and sharp in those windows from which the storm windows had not yet been removed and where the corridor received light only from one side. Not long after the storm windows were removed, and the windows were left open most of the time, when the bird disappeared, having spent quite an amount of time, for about two weeks, in the manner described above. As you are aware, there are eight maple trees standing in the open court, three of them within twenty-five feet of the windows; to these he would withdraw at intervals, to catch his second wind, as it were, before returning to the charge. I tried to ascertain whether he had a nest in the adjoining trees, but failed to discover one. It is likely though that he is domiciled near by, and that his vicious attacks on his image in the glass were meant for an imaginary foe, who might endanger his little household."

So far my correspondent. I might add that during my sojourn at the college, a Summer Tanager was a constant visitor to the grove on the College Campus, and nested there for a number of years

Here is another little item in connection with bird lore that may be of interest. On one of my visits to the college, three years ago, I was informed that a certain bird had often been seen in the students' chapel. As the chapel is skirted on two sides by trees, and the windows are usually open during the summer, it is not a rare occurrence to find a stray bird fluttering about on the inside. But here was said to be a case of a frequent visitor to the sacred enclosure — a bird with a religious turn of mind, so to speak. I examinied into the matter, and, sure enough, there was my bird, a female Yellow-billed Cuckoo (*Coccyzus americanus*). She was not flying about, but stood on the floor, on which she had laid an egg, and to all appearances was standing guard over it. I secured the egg, which is now preserved in the college museum.— PIRMINE M. KOUMLY, *Seneca, Kansas.*

Breeding of the Rough-winged Swallow at Shelter Island, New York.— While collecting with Mr. W. W. Worthington of Shelter Island, N. Y., June 3, 1893, I found a nest of the Rough-winged Swallow containing four much incubated eggs. The nest was placed in a bank about forty feet high, on the shore; it looked like an old Bank Swallow's burrow. It was two feet from the top of the bank and twenty-seven inches deep. The chamber the nest was in was twelve inches in diameter, and was completely filled with dried sea grasses on which the eggs were laid.

I shot the female, and as it fell in the water the male came up and tried to help its disabled mate, at the same time uttering a most plaintive cry.— HARRY B. SARGENT, *New York City.*

Cœreba versus Certhiola.—In a recent number of 'The Ibis' (April, 1893, pp. 246, 247) Mr. Sclater takes American ornithologists to task for having "recently caused needless confusion by proposing to reject the long-recognized name *Certhiola* of Sundevall [1835], and to use in its place *Cœreba* of Vieillot [1807], a term always hitherto applied to a different genus." Mr. Sclater, to make his point, claims that *Cœreba* Vieillot "was intended as a Latin equivalent for the 'Guit-Guit' of Buffon; and the 'Guit-Guit' of Buffon was primarily the South American species usually called *Cœreba cyanea*," etc. While it is true that Vieillot evidently intended to include other species in the genus *Cœreba*, the fact remains that he definitely mentioned at this time only one species, "Le Guit-guit sucrier, *Cœreba flaveola*." This then, by all rules of nomenclature touching the restriction of genera, must be the type of the genus *Cœreba*, and consequently Sundevall had no right, nearly thirty years later, to make *Cœreba flaveola* the type of a new genus *Certhiola*. It makes no difference that Vieillot later placed other species in the genus *Cœreba;* at the time *Cœreba* was established *C. flaveola* was the only species so referred, and becomes therefore necessarily the type of the genus. Whatever we may imagine to have been his "intentions," we have to be governed by what he actually did. Hence the synonymy of the genus stands as follows:

Cœreba Vieillot, Ois. Am. Sept., II, 1807, p. 70. Type and only species, *C. flaveola* = *Certhia flaveola* Linn.

Certhiola Sundevall, Œfvers. Vet.-Ak. Handl. 1835, p. 99. Type *C. flaveola.*

Mr. Sclater (Cat. Bds. Brit. Mus., XI, p. 31) gives "*C. cyanea*" as the type of Vieillot's genus *Cœreba*, as follows:

"Cœreba *Vieill., Ois. Am. Sept. ii*, p. 70 (1807). . . . Type, C. cyanea."

We have thus the incongruity of a species given as the type of genus which was not placed in that genus till some years after the genus was originally established! In fact, as I have previously stated (Auk, VIII, p. 95), it proves unsafe to take as types of genera the species explicitly stated to be such in the various volumes of the British Museum 'Catalogue of Birds,' since it sometimes turns out that some other species is in reality the type.

It may be added that it seems a little singular not to find *Cœreba flaveola* Vieill. anywhere cited in Volume XI of the 'Catalogue.'—J. A. ALLEN, *Am. Mus. Nat. Hist., New York City.*

Stray Notes from the vicinity of Muskeget Island, Massachusetts.—**Charadrius squatarola.**—Tuckernuck Island, May 10, 1893. While in my stand today, which faced a large sand flat recently exposed by the retreating tide, I perceived Black-bellied Plover picking up some large worms which they held wriggling in their bills before swallowing. Never before having seen them eat such, I secured several for identification. They are locally known as 'cod worms,' and resemble a centipede, being flat to oval, their sides being fringed with legs. In color they vary from a blood red to a dirty brown. They are from four to six and a quarter inches long. These worms first make their appearance on the flats in shoal water during the latter part of March, and they disappear early in June. Mr. Samuel Henshaw of the Boston Society of Natural History has kindly identified them as *Nereis*, the clam worm of the fisherman.

Somateria dresseri.—Muskeget and Tuckernuck Islands, March 30 and 31, 1893. Almost all the American Eiders which have been living in these waters, and which I estimate at about six hundred, departed on these dates.

Ægialitis meloda.—While walking along the shore of Muskeget Island, March 26, 1893, I saw a Piping Plover and heard it whistle. On the 29th I saw two near where I saw the first. These dates are earlier than I have before remarked.

Tachycineta bicolor.—At Muskeget Island, March 26, 1893, I saw a White-bellied Swallow apparently flying due north on migration; it was at an elevation of about sixty feet.

Circus hudsonius.—Muskeget Island, March 26, 1893, I saw a Marsh Hawk in the red plumage, apparently flying on migration northward, at an elevation of about ninety feet.

Branta bernicla.—Muskeget and Tuckernuck Islands, March 26, 1893. I estimate the number of Brant living in these waters at this date at about six hundred. Two wing-tipped birds I have in confinement eat with avidity the alga *Ulva lactuca*. They also eat *Zostera marina*, preferring the white portion farthest from the extremity of the blade. They cut this up by chewing first on one side and then on the other of their mandibles which cuts the grass as clean as if scissors had been used. The motion reminds one strongly of a dog eating, the bird turning its head much in the same way. They are fond of whole corn and common grass. These confined birds drink after almost every mouthful from a pan of fresh water. The wild birds living in this neighborhood have no opportunity of obtaining fresh water.

Asio accipitrinus.—At Muskeget Island, March 27, 1893, I saw a Short-eared Owl, which appeared to be domiciled.

Numenius hudsonicus.—Nantucket Island, July 17, 1893. The first Jack Curlew were observed today. They were at the western extremity

of the island. Two birds were seen first, and soon afterwards twenty-two more. On the 23d two birds were seen towards the western, and twenty-four towards the eastern part of the island, and I lean to the opinion that they are the same birds noted on the 17th.—GEORGE H. MACKAY, *Nantucket, Mass.*

Notes on some Connecticut Birds.—Erismatura rubida.—On June 5, 1893, three adult Ruddy Ducks were killed here and brought to me. Two were males. The eggs in the female were larger than 'buck-shot.' The flock contained five individuals. I find no previous record of the species being found in our State at such a late date. Several of these Ducks have been taken at Seaconnet, R. I., in July (Miller, Auk, VIII, 1891, 118).

Ceophlœus pileatus — Through the kindness of Mr. Gurdon Trumbull I am able to record a recent capture of this rare Woodpecker. One was shot at Granby, Conn., Nov. 1, 1890, by Mr. Lewis S. Welch of Hartford. Mr. Trumbull saw the bird soon after it was mounted.

Empidonax pusillus traillii.— A male was killed at Norfolk, in the northwestern part of the State, June 20, 1893, by Mr. W. E. Treat. It was in low alders. Others were heard.

Vireo solitarius.—Mr. Treat found a nest at Norfolk, June 23, 1893, containing four fresh eggs. It was in a small hemlock and about six feet from the ground. The female was secured.

Turdus aonalaschkæ pallasii.— Two nests of the Hermit Thrush, each containing three fresh eggs, were taken at Norfolk, June 20 and 23, 1893, by Mr. Treat. He found this Thrush common there. I think the actual nesting date in Connecticut has not previously been recorded.— JNO. H. SAGE, *Portland, Conn.*

Connecticut Notes.— On August 24, 1893, after the severe storm which swept the Atlantic coast, I visited the West Haven shore in the hopes of finding some shore birds. I had gone but a short distance when I noticed a large Hawk in pursuit of some small bird, apparently a Sandpiper. As they passed within a few yards of me I shot the Hawk, which proved to be an American Goshawk in immature plumage.

The bird which he had pursued settled in the grass near the edge of a small pool. On walking to the spot I flushed and shot the bird which was a Northern Phalarope in high summer plumage. Both birds were in excellent condition, but neither had anything in the stomach.— A. H. VERRILL, *New Haven, Conn.*

Rare Birds near Baltimore, Maryland.—I wish to record the occurrence of several rare birds in the neighborhood of Baltimore during the past few years. As far as I can learn *Geothlypis philadelphia* and *Dendroica cærulea* have not been previously observed in this locality, and in the case of the latter the range of this species in summer is also considerably extended by the capture here of an adult and young in July.

Strix pratincola.—March 14, 1893, Mr. A. Wolle, the well-known Baltimore taxidermist, shot an adult near the Old Marine Hospital, Anne Arundel County, and ten days later procured a second individual at Hawkins Point about a mile distant. While passing through the tract of woods near the Marine Hospital about July 15, Mr. Wolle found a Barn Owl's nest containing five young. The nest was situated in a hollow tree but a short distance from the spot where he had first observed the Owl shot March 14. The young varied considerably in size, the smallest being apparently about twelve days old while the largest was perhaps two weeks older. The Barn Owl is a rare bird here, and, as far as I am aware, has never been found breeding before.

Lanius borealis.—A female in the flesh was presented to me during the past winter by Mr. Wolle. It was shot by him Jan. 10, 1893, a few miles east of the city. Later in the winter two or three other Butcher-birds were observed by local collectors. Mr. Wolle informs me that on several occasions he has observed birds of this species during severe seasons.

Dendroica cærulea.—About July 7, 1893, I heard an unfamiliar bird song in the top of a large oak overhanging our country residence near Towson. Although field-glasses were brought into use, I was unable to discover the bird among the leaves. A few days later this song was noticed a second time, but I was equally unsuccessful in locating the bird uttering it. July 14 I again heard the same notes in an oak some hundred feet distance from the house. Half way up in this tree, at a height of perhaps thirty feet, three or four birds were observed moving about in a rather nervous way in search of insects. Not being able to identify them I shot one, and it proved to be an immature male Cerulean Warbler. After an interval of silence lasting but a few moments the now familiar song began again. This time the singer, an adult male of the same species, was in full view, and I quickly secured it. Returning to the same tree about ten minutes later I succeeded in taking a second immature bird. Although careful search was made I was unable to discover any more of these birds in the neighborhood.

The occurrence of an adult accompanied by young early in July suggests that the latter were reared in the neighborhood. Although a bird of the Carolinian Fauna, the Cerulean Warbler has not previously been observed in summer east of the Alleghanies, so that the capture of these birds adds considerably to the breeding range of this species.

Geothlypis philadelphia.—I shot a female May 23, 1891, in a swampy thicket about a mile east of Towson. It was in company with another bird apparently of the same species, but owing to the character of the surroundings I was unable to obtain them both. Since the capture of this bird two other Mourning Warblers have been observed in the neighborhood of Baltimore. A letter from Mr. George H. Gray to me states that he saw one singing in "a damp clump of maple saplings near Gwyn's Falls on the Franklin road," June 3, 1893. He says that there can be no doubt as to the identity of the bird, since he watched it for quite a while with a strong glass. Mr. Gray also informs me that one of these Warblers was noted by his friend Mr. P. Blogg about a year ago not far from the city.—J. HALL PLEASANTS, JR., *Baltimore, Md.*

CORRESPONDENCE.

[*Correspondents are requested to write briefly and to the point. No attention will be paid to anonymous communications.*]

The Evolution of the Colors of North American Land Birds.— A Reply to Criticism.

To the Editors of 'The Auk':—

Dear Sirs: In 'The Auk' for April Mr. Allen takes occasion to review my recent paper, finding therein little to commend and much to condemn. Were his remarks mere statements of personal opinion I should not venture to question them, but as he has mentioned a number of passages confirming his opinions, it seems to me that they are worthy of a somewhat fuller discussion. It is generally held a just criterion of criticism to judge a writer by what he has professed to do rather than to blame him for not accomplishing what was not attempted, but this rule Mr. Allen seems to have disregarded. He does me the justice of quoting fully from the preface the intention of the paper, viz., to put forth a provisional explanation of the markings of birds suppported by a greater or less number of facts, with the hope of awakening interest and stimulating research in a new field, but in the rest of his review treats this statement of my intentions as if it had no reference to the work in hand. [1] He seems to have little respect for speculative science, and condemns the philosophizing of Poulton, Romanes, and Weismann. It appears remarkable indeed that any scientist since the time of Darwin should be too narrow to see the value of such work. For example, Mr. Allen is a firm believer in the inheritance of acquired characters, and can he for a moment deny that the intense discussion of this subject incited by the researches and speculations of Weismann has given the world a far deeper and broader insight into this most intricate of questions? [2] There can be no doubt that the speculative method is open to great abuse when recklessly pushed in advance of empirical observation, but when coupled with this it becomes all important in the advance of real knowledge. Mr. Allen would have us progress only along such lines as we can absolutely establish for all time, but this is clearly impossible. Science like all other knowledge is a process of growth in which there is a continual selection of truth and an elimination of error. Let us by all means have an abundance of material to select from. Look at almost any scientific work of fifty years ago, and unless it treat of mathematics it will be found valueless, in large measure, at the present time, although its place may have been an important one as a stepping stone to something better.

But aside from general considerations, it is of some of his detailed criticisms that I wish to speak. Mr. Allen says without any reservation that my interpretation of the change of color in the young Arizona Hooded

Oriole is erroneous. He does not state why, as he says, "it is evident that this mottled phase of plumage, occurring in a very large number of species, is a permanent one for the time being . . . ," but remarks that the assertion of a transition plumage "must be based on observation of the living bird for a sufficient period to determine the nature of the change of color." If this be so, then how can he so positively assert that the color does not change in the young Oriole? Has he observed this in the living bird? If so, he has forgotten to mention the fact, but if not, his own conclusion is of no more value than mine, according to the requirements he has himself made. However, as far back as 1835, as is noted in my paper, Yarrell recorded experiments of the sort demanded by Mr. Allen, to prove that in certain species there is a change in color without moult, viz., by marking feathers on living birds and observing the change. Mr. Witmer Stone writes me on this subject as follows: "I have been paying especial attention to young birds in first plumage during the past year, and while I cannot agree with Yarrell's idea of the plumage changing without moult as a general rule, I think that in some instances it is correct. In *Icterus spurius*, for instance, I cannot detect any moult from the first plumage to the fall dress of the 'bird of the year,' but there seems to be a darkening or intensification of the pigment." Dr. C. Hart Merriam and Dr. L. Stejneger have both asserted that in certain species a pigment change without moult occurs, and even if the old experiment of Yarrell, when applied to Orioles, should prove my deduction to be incorrect, it would not invalidate the assertion that in certain exceptional instances there is a change of color without moult. [3]

Concerning the mode of pigmentation of a feather, I would say that although in the text of my paper I have neglected to allude to the embryonic development of a feather, I am of course aware that the pigment is deposited during the process of formation of the feather. I am acquainted with what Burmeister, Owen, Wiedersheim, and others say about feather growth, but find nothing in their accounts to invalidate the position taken in my paper—viz., that the pigment is deposited along the lines of greatest and least resistance. Burmeister does not even allude to detecting pigment cells until the feather has attained a tolerably advanced stage of development. He says: "But, if the feather be colored, an accumulation of pigment is formed on each of the oblique striæ above each of its individual cells, and this is larger the nearer the cell is to the main stem of the barb."[1] This remark with others of a like nature would rather strengthen than detract from my contention that pigment deposition is in accordance with Prof. Cope's law of growth force.

The remarks upon hybrid feathers which Mr. Allen calls "the various classifications and generalizations based on this erroneous departure," are quite independent of the theory intended to account for them. It is merely an attempt to classify certain facts, which, so far as I can discover, have been previously ignored,—viz., the plan of coloration of individual feathers

[1] Nitzsch's Pterylography, p. 8.

which in masses produce a definite color pattern. Mr. Allen's little exclamation about "the fewer facts for a nicely spun theory the better" is consequently not inserted in a suitable place, since I am not dealing with theories in this particular instance.

While Mr. Allen's objection that the pigment is deposited before the feather leaves the sheath does not interfere with my view of deposition along lines of greatest and least resistance, it may very seriously interfere with his own theory of climatic influences on color (which I have also accepted in my paper). Mr. Wallace writes me as follows on this subject: "There is a point you do not refer to which seems to me most important—that is, whether the colours and markings of the feathers are developed in the young feather before it has opened out of its sheath, as we know that all the markings of the wings of butterflies are to be seen before it emerges from the pupa. If it is so, then *climate can hardly have any direct influence*."[1] It is quite apparent that if Mr. Allen is not prepared to admit that some pigment is either deposited on or withdrawn from the fully formed feather, then climate can produce no effect on pigmental colors. It would thus seem as if he should at least be willing to share the humiliating mistake with which he charges me. [4]

In a foot-note he also alludes to a supposed new feather structure noted by me in 'Zoe,' and refers me to Coues's 'Key to North American Birds' for a description (p. 86). Following is the description there given: "*Filoplumes, filoplumæ*, or thread-feathers, have an extremely slender, almost invisible stem, not well distinguished into barrel and shaft, and usually no vane, *unless a terminal tuft of barbs may be held for such*." Upon referring to Nitzsch I found only two forms of filoplumes figured, both with the terminal tuft of barbs, and I consequently supposed the structure which I briefly and tentatively recorded as having no barbs whatever, was different. Upon further examination of the text of Nitzsch I find he has included this form also under the head of filopluma, without, however, figuring it in the plate.

Mr. Allen is also quite right in saying that I have been handicapped in my work by insufficient knowledge of exotic birds, my opportunities for studying these having been very limited upon the Pacific Coast where no satisfactory collections are available. In speaking of patterns of marking with which I am unfamiliar, I had no intention of asserting that such did not exist, but simply that they were quite unusual if they did occur among North American species, whereas other forms are very often repeated. Exceptions (even a considerable number of them in fact) would not invalidate the conclusions so long as a fair ratio was maintained between the unusual forms and the most common styles.

Mr. Allen must have taken especial pains to discover a contradiction where none exists in referring to the Brown Creeper, in order to bring in his phrase of "slipshod generalization." [5] It would seem as if in a paper

[1] Italics mine.

where so many generalizations are made he could have been more judicious in selecting an example to fit the term. In speaking of color determining habit I referred only to the general shade of color—brown genera would be forced by natural selection to the ground and olive-green birds to the trees; but in speaking of the Brown Creeper I refer to its detailed markings and streaks, in which we have not a perfect illustration, but "the nearest approach" to an instance of special protective resemblance.

In speaking of the Passenger Pigeon Mr. Allen takes the trouble to italicize the assertion that the tail markings to which I allude as recognition marks "are found only at the extreme base of the tail, within the area normally concealed by the coverts, *and are therefore not visible under any ordinary conditions.*" If he will take the trouble, instead of merely looking at a skin with closed tail, to *spread the tail feathers*, as a bird does at every turn in its evolutions, he will find a conspicuous broad band of dark brown strongly relieved against the white of the under tail-coverts and contrasted also with the conspicuous white outer tail-feathers. Although I have seen the Passenger Pigeon alive I do not now remember how distinctly the tail markings showed, but I have in no instance in the text of my paper implied that the conclusions were based upon the study of live birds, except in certain instances where this was stated. [6] Slips in nomenclature are never pardonable in a work of this sort, but by way of explanation I may state that I was suffering from an attack of nervous prostration during the publication of the latter part of the work, and was physically unable to give it the care which it demanded.

Mr. Allen fails to see any use in the plate showing the evolution of the pattern of head markings, since, as I have said in the text, the relationships "are not supposed to be genetic." The plate is intended to show that among living North American birds various types of head markings exist which are related more or less nearly to one or all of the five types with simple longitudinal streaks. There is no way in which we can now learn the colors of extinct birds, and it is consequently entirely out of the question to think of presenting a genetic series of head markings to show their evolutionary sequence. The most that can be done is to show that living birds happen to represent different stages in an ideal sequence from a streaked plumage, and this taken in connection with the fact that the streaked feather is the elementary type of feather marking, [7] and with the *a priori* considerations as to why it should be so, serves to confirm, without necessarily proving, the supposition that the head markings have all been evolved from longitudinal streaks.

The fact that in comparing low groups of birds like the Pigeons and Tinamous with such high groups as the Thrushes and Sparrows the latter are found to have a streaked plumage where the former have not, is in no wise contradictory to the assertion that the streaked plumage is the primitive type. Surely no one ever made the absurd assertion that color development advanced from the lowest to the highest groups of birds *pari passu* with structural development. How then could we explain the high development of markings in Auklets and Ducks, and the brilliant plumage

of Pigeons? Many large groups have become highly specialized on a low type of organization, and show a far more complicated color development than the highest families in the scale.

In a review as long as that of Mr. Allen, it would have seemed reasonable to expect that he would have found room for at least a bare mention of the most important suggestions in the paper in qnestion. Although he alludes to the "large amount of nonsense" in the discussion of recognition markings in which I have simply elaborated some of the views of Wallace and Poulton, following directly in their footsteps, he does not even mention the law of the assortment of pigments, which Prof. Cope considers the most important original contribution of the paper, [8] nor to numerous other matters of greatly more importance than the tail markings of the Passenger Pigeon. I am well aware that the paper is open to an unlimited amount of criticism, but as I asserted in the preface it was not written with any idea of being final or conclusive, but simply to stimulate thought in a new line and to awaken more competent investigators to a new field of research. If it accomplish this I am quite willing to see it overwhelmed with criticism and die, but I appeal to the ornithologists of America not to let it die without bearing some little fruit. Whatever the critics may say I am convinced that amongst the mass of rubbish, if such it be, there are some few suggestions that will be of value in the elucidation of the problems of color evolution, and I most ardently hope that they will be sought out and developed into something better and more worthy of lasting.

CHARLES A. KEELER.

Berkeley, Cala., Sept. 11, 1893.

[Having given Mr. Keeler so much space, my reply must be as brief as possible, and might be much shorter than it is had Mr. Keeler been a little more exact in his statements as to what I really said in my review of his work. To save space I have inserted numbers enclosed in brackets after the points which seem most to require notice, and reply to them in the correspondingly numbered paragraphs which follow.

1. In fact, Mr. Keeler himself seems to have forgotten this modest and tentative attitude throughout the greater part of his work.

2. What I really said on this point needs no qualification, namely, that "much of the speculative writings of Poulton, Romanes, Weismann, and many other writers who have of late been so prolific of explanations of the abstruse things in nature" is natural history romancing posing as science. This is not a general condemnation of the scientific work of these writers, for it is far from my desire to deny to either of them, and particularly to Weismann, the credit of contributing, through genuine research, to the real progress of science. Neither did I so thoroughly condemn Mr. Keeler's own work as his opening sentences above imply; "on the contrary," to quote from my review, "we find much to commend in Mr. Keeler" (p. 190); and again: "In the two hundred and odd pages

devoted to the 'Colors of North American Birds' there is much that is suggestive and worthy of commendation, mixed with a great deal that is weak and unphilosophical," etc. (p. 191). Or again: "While there is much that is valuable in the work, and many points that are well taken, Part II especially is largely vitiated by unsound reasoning, by misapprehension of facts, or by lack of general information on special points" (p. 194). The trouble is that Mr. Keeler seems unable to distinguish between pure speculation and reasonable hypothesis.

3. It is not claimed that there is never any change in the color of feathers without a moult, aside from the fading and very pronounced change we know to take place simply by exposure of the plumage to the elements. The case of the Oriole simply typifies a large class of cases where there is a transitional, immature dress characteristic for a season or two, according to the species, of the young male in a great many kinds of birds. The evidence, not altogether negative, that this is what it seems, and is generally believed to be, namely, a true transition stage, where often it is difficult to find two birds marked exactly alike, is so overwhelming and conclusive that the *onus probandi* fairly rests on the supporters of the opposing theory that the birds are gradually acquiring the perfect or adult plumage by a radical, gradual change of color in the mature feather *without* moult. To recite the evidence against this kind of change would require far more space than can here be spared.[1] In this connection, however, it may be noted that a microscopical examination of the mature feathers of Orioles, which Mr. Keeler assumes gradually change from olive to black, will probably show that pigment has very little to do with the case. Should such prove to be the fact the question could be readily settled; for it seems too much to suppose that there can be sufficient structural or molecular change in the mature feather to produce a radical change of color.

4. This is a postulate I am surprised to see emanate from Mr. Wallace, or even Mr. Keeler! It is true that we know little of the *method* of physiological action resulting from climatic influences, but the *results* of this potent force, encountered on every hand, are too evident to be overlooked. That humidity, or its absence, acts directly on the fully formed feather so as to cause the "*deposit*," or "*withdrawal*," of pigment is a conception too absurd for serious consideration, beyond the obvious fact that feathers do fade through exposure, in the living bird as well as in the museum specimen, somewhat in ratio to the degree of aridity and the intensity of the bleaching sunlight to which they are exposed. But the gradual evolution of a permanent change of color, such as marks geographical races or representative species for example, must obviously be due to the long-continued action of the environing conditions upon the

[1] See some remarks on this point, however, in Bull. Am. Mus. Nat. Hist., Vol. V, p. 108.

whole organism, and thus involving, among other changes, the amount and character of the pigment *at the time of its deposition during the formative stage of the feather.*

5. Any fair-minded reader who will take the trouble to see how the phrase "slipshod generalization" is introduced will see that it has no necessary bearing on the case of the Brown Creeper, but relates directly to his assumption that "the habits of birds have been more or less determined by their colors," and to his explanation of how they have been so determined. In case there is any connection between color and habits, it is habit that has determined color, according to the views of most evolutionists, rather than color that has determined habit, which seems to be purely a discovery of Mr. Keeler's.

6. When Mr. Keeler has observed the living bird and found that when the Pigeon spreads its tail it spreads only the rectrices and not the lower coverts as well, it will be time to consider the point made in his rejoinder as well taken.

7. It is perhaps worth while to state that "the *fact* that the streaked feather is the elementary type of feather marking" is not accepted as a "fact" to the extent Mr. Keeler's positive statement might lead one to suppose. Indeed, the opinion of several eminent investigators who have recently expressed themselves on the subject is quite the reverse, both Kerschner and Gadow, for example, believing that the distribution of coloring matter in *transverse bars and lines* is phylogenetically the older method.

8. Professor Cope, in reviewing Mr. Keeler's work in the 'American Naturalist' (June, 1893, p. 459) has said: "The most important contribution towards the discovery of the origin of colors in birds by Mr. Keeler is his *demonstration*[1] of the law of the Assortment of Pigments. His classification of our birds in accordance with their color relations, is a valuable preliminary to further research." But it is impossible for me to believe that Professor Cope spoke from a due consideration of the subject or from any intimate knowledge of the facts involved. His careless mention of the matter is evident from his reference to Mr. Keeler's "demonstration" of his law, when Mr. Keeler tentatively puts it forth with the usual 'ifs' and other qualifications, and says distinctly that the "theory could not be demonstrated without further study of the chemical properties of pigment"; and further adds: "Until such experiments have been made, however, it is necessary to depend upon appearances, and here there are many facts that seem to support the view." This, then, is Professor Cope's "demonstration" of "the law of the assortment of pigments," which seems to give Mr. Keeler so much consolation.

It is needless to say that I look upon this theory as no better than numerous others I took the trouble to criticise, and almost regret that I am now called upon to expose its worthlessness. It is based on pure

[1] Italics mine.

guess-work, with no basis in experiment, microscopical study, chemical analysis, or properly observed facts of any sort, as shown by Mr. Keeler's own statements. He is speaking, or supposes he is speaking, of pigment, but his remarks show that he refers to color in a broad sense. Yet no blue pigment has ever been discovered, and green and yellow are well-known to be not by any means always due to pigment, but are merely 'objective structural colors.' Thus, according to Gadow, violet and blue always belong to this category, green almost always, and yellow occasionally. And among the instances he cites where "yellow feathers are in reality without pigment" are such birds as *Icterus* (!), *Xanthomelas*, *Picus*, etc. Green, except in the Musophagidæ, "is always due to yellow, orange, or grayish brown pigment with a special superstructure, which consists either of narrow longitudinal ridges, . . . or else . . . the surface of the rami and radii is smooth and quite transparent, while between it and the pigment exists a layer of small polygonal bodies, similar to those of blue feathers." Further space cannot be given to the subject in this connection, but the reader is advised to carefully study, in connection with Mr. Keeler's "theory of the assortment of pigments," and related parts of his work, the article on 'Colour' by Dr. Hans Gadow in Professor Newton's recently published 'Dictionary of Birds,' from which some of the above statements are quoted.

It is evident that if Mr. Keeler had possessed what may be termed even a fair superficial knowledge of the investigations that have been made respecting pigments, and the structure of feathers in relation to color, he could not have propounded so utterly defenceless a hypothesis as his "Law of the Assortment of Pigments," and would have omitted a great deal of the "rubbish" that he has put into his book on the general subject of the "evolution of colors" in birds.

Many of the minor points in Mr. Keeler's rejoinder are passed over as hardly demanding space for formal consideration, even though the real bearing of my criticisms is in several instances greatly misrepresented.

In conclusion I may add that the task of reviewing Mr. Keeler's book was a painful one, and was prompted only by a sense of duty, not only to the many inexperienced readers who might be misled by it, but as a needed protest against a very prevalent kind of pseudo-science that has of late gained great currency and popularity. That some such antidote was not wholly unnecessary is shown by the fact that the editor of a prominent scientific journal is found to have endorsed one of its most groundless hypotheses.—J. A. Allen.]

Birds of British Columbia and Washington.

To the Editors of the Auk:—

Dear Sirs:—Over the initials "C. F. B." there appeared in the last number of 'The Auk' a review of my final paper on the Birds of British Columbia and Washington.

Had the paper merited one half the space given it by its distinguished critic, or had that gentleman a much smaller influence than he is supposed to have as an authority on American ornithology, I should refrain from any rejoinder to his unhappy criticisms. Mayhap a few readers of 'The Auk' have taken some pains to verify the rather startling disclosures of C. F. B., and, like myself, have been somewhat amazed at the strange mixture of truth and fiction which he has heaped upon the article. But the majority have no time for such analysis; they read the review, translate the initials, and that settles it. For the just opinions of many such readers of our quarterly journal I have much regard, and, ere they pass final judgment on it, I would plead somewhat to the indictment.

The "principal fault" of the paper is stated to be "a certain lack of care and thoroughness in its preparation."

Six months of fairly diligent labor was spent almost exclusively in preparing the paper after my return to Philadelphia from the West. A preliminary report containing nearly all of the objectionable features designated by C. F. B., was published in 'The Auk.' All determinations of importance were based on comparisons with ample material from the principal museums and were in many cases confirmed by well-known active members of the A. O. U.

My knowledge of the bibliography of Washington and British Columbia birds is said to be "meagre," because of the "long array of species which he proceeds to add to the list of birds known to occur in each of these districts."

In support of this assertion my reviewer names twenty-six such species from one or the other of the two lists on pages 22 and 23 of my paper. On page 22, referring to the main list in question, viz., that of additions to previous faunal lists of Washington, I say, "to the combined lists of Cooper, Suckley and Lawrence twenty-five species of Washington birds are added. *These, with those not included in Mr. Lawrence's Grays Harbor lists are:*"—then follows the list. Anyone taking the trouble to look over the names excepted to by C. F. B., "in one or the other list" will see that he has quite ignored my foot-note on page 23, which states that species in the list previously recorded by Cooper and Suckley are designated by an asterisk.

Two thirds of the birds taken exception to have this mark. My critic has utterly failed to see that the list is simply one of species seen by me and not recorded by Lawrence, and in so doing he has grossly misrepresented me. Among other species in my Washington list, he gives as "heretofore recorded," *Aythya americana, Colymbus holbœllii, Larus brachyrhynchus, Totanus flavipes, Falco columbarius suckleyi* and *Cypseloides niger*! None of these being recorded in Cooper, Suckley and Lawrence it makes no difference, so far as the intent of said list is concerned, whether these have been heretofore recorded or not. Apart from this, however, I would ask C. F. B. to verify his own statement in regard to these six birds by telling the readers of 'The Auk' just where

and by whom they were "previously recorded" for the State of Washington. To one so "fortunate" in his "bibliographical researches" surely this should be an easy matter!

It is almost a pleasure to state, however, that I have, by omitting to place asterisks after *Circus hudsonius*, *Asio wilsonianus*, *Chætura vauxii*, *Pica pica hudsonica*, and *Parus atricapillus occidentalis*, given my critic some cause of complaint. These omissions are not only lamentable errors but they illustrate in no small degree that "carelessness" which C. F. B. has in such eminent degree both denounced and practised on this occasion.

By way of climax to the sermon on "activity," "faunal peculiarities," and zoögeography,— we read the following: "but they [readers of 'The Auk'] may wonder at the carelessness which enables the author to swell his British Columbia list *with species mentioned by Chapman and Fannin*[1] (whose recent paper he does refer to), and even to 'add' to the Washington record two birds whose type specimens undoubtedly came from that State."

The two birds referred to are *Chætura vauxi* and *Dryobates pubescens gairdneri*.

My previous remarks on the Washington list cover both these cases, the Woodpecker being starred and, in the original copy, the Swift also, but in revising the proof the printer dropped the star and the omission was overlooked in final proof-reading. Whether the types of these species came from Washington is far from the "undoubted" fact which C. F. B. would have us believe. No careful critic presumes to set hard and fast lines to the type localities of J. K. Townsend's Columbia River novelties.

Coming now to the main part of his accusation, C. F. B. has charged me with adding as new to British Columbia, species already recorded by Fannin and Chapman.

Notwithstanding the gravity of that charge he does not designate which they are, leaving it to be inferred there are several. In his list of errors I have found two names coming under this category. One of these is *Bubo virginianus subarcticus* and, as is inferred, it may be found in the lists of both Chapman and Fannin. This was a pure and simple *lapsus pennæ* on my part and should have read *B. virginianus arcticus*. The annotated list would show any one, careful enough to inquire, that this was, as I have said, only a slip of the pen. It was due to carelessness, no doubt, but not the wilful carelessness implied by the terms of its condemnation. The other bird is *Glaucidium gnoma*. Chapman's list recorded only *G. gnoma californicum*. In Mr. Fannin's list all the Pygmy Owls of British Columbia are classed under one name, *Glaucidium gnoma*. Mr. Fannin's list was chiefly based on western Cascade specimens, and as he fails to distinguish between the type and its subspecies, and very little of his collecting was done in the restricted "interior" habitat of true *gnoma*, it is evident that *californicum* was the form to which he had chief reference.

[1] Italics mine.

I was permitted to examine all of Mr. Fannin's specimens in the Victoria Museum but found no *gnoma* skins among the *californicum*. If Mr. Fannin had intended in any way to record *gnoma* instead of *californicum*, or to lump the two under one name, he failed to say anything about it in a letter of exceptions to my paper written me on receipt of a copy. On these accounts I thought, and still maintain, that it was just to consider Fannin's reference to the Pygmy Owl as referring authoritatively to no one form but presumably to *californicum* for the most part, and that I, having an authentic specimen of *gnoma* from the interior, was justified in recording it as a bird new to the recorded fauna of British Columbia. Mr. Fannin, having taken no exception to this ruling, I trust C. F. B. will accept it also, and absolve me in both instances.

As to the value of my determinations on the status of certain species and races in the A. O. U. Check-list, this is not the time nor the place for either professional or amateur to venture judgment. Between much that we strive to decide in this line there is but the toss of a penny so far as the worth of individual opinion goes. The fiat of a Committee on Nomenclature is, logically and scientifically, not a whit better, perhaps, but for the sake of peace and harmony we are glad to have it.

SAMUEL N. RHOADS.

Philadelphia, Aug. 8, 1893.

[The foot-note which Mr. Rhoads assumes that I ignored was by no means overlooked. This foot-note related to a double-columned list of birds headed by the words: "To the combined lists of Cooper, Suckley and Lawrence twenty-five species of Washington birds are added. These with those not included in Mr. Lawrence's Gray's Harbor lists are" [here followed the list]. It seemed too unlikely that Mr. Rhoads could think it worth while to institute such a formal comparison between his list and that of any single one of the various previous writers on Washington birds and there appeared no reason why Mr. Lawrence's lists should be selected and the rest ignored. Did he mean it to be understood that the species referred to were new for Washington (ruling out the Cooper-Suckley records, much as he had done those of J. K. Lord)? It certainly appeared so, and such was assumed to be the case. What Mr. Rhoads's real intentions were I am now even more in doubt. For in this letter he says "the list is simply one of species seen by me and not recorded by Lawrence" yet only a few lines above he has said it is a list "of additions to previous faunal lists of Washington" thus, himself definitely confirming my conclusion which he says "grossly misrepresents" him. Taking this latter sentence in connection with the statement on the opening page of the paper itself "Since the Cooper-Suckley Pacific Railroad Reports nothing of much value relating to Washington birds has been published except the local lists of Mr. R. N. [illegible] Lawrence" the inference is unavoidable that at that time he really did not know of any other writers on the subject.

The principal criticism whose justice Mr. Rhoads denies, was upon his lack of care and thoroughness. Many further evidences of this might be shown, were it not too well illustrated by his own admissions in the 8th, 11th, and 13th paragraphs of the present letter, and by the fact that not even now, in writing it, did he take the trouble to extend his 'bibliographical researches' to such publications, for instance, as the Bulletin of the Nuttall Club and the Bulletin of the American Museum. They would have supplied him with records of several of the birds which he selects to confound his reviewer. The following are records for all the species he names:—

Aythya americana — *Hubbard*, Zoe, III, 142.

Colymbus holbœllii — *Chapman*, Bull. Am. Mus. N. H , III, 129, 155.

Larus brachyrhynchus — *Chapman*, Bull. Am. Mus. N. H., III, 130, 155.

Totanus flavipes — *Townsend*, 'Narrative,' 335.

Falco columbarius suckleyi — *Brewster*, Bull. N. O. C., VII, 227.

Cypseloides niger — *Hubbard*, Zoe, III, 143.

What he says about the lack of an exact type locality for *Chætura vauxii* and for *Dryobates pubescens gairdnerii*, has nothing to do with the case. *Chætura vauxii*, Townsend explicitly states, came from the Columbia River, and Audubon (for it was he who described the Woodpecker—not Townsend as Mr. Rhoads has it) gives the same source for his type.

More might have been said concerning his discussion of certain subspecies, but it is hardly worth while. If Mr. Rhoads really does not care "the toss of a penny" for "the fiat of a Committee on Nomenclature" as to the value of his "determinations on the status" of such forms as *Melospiza lincolni striata* and *Sylvania pusilla pileolata*, it is perhaps fortunate for his peace of mind.— C. F. Batchelder.]

NOTES AND NEWS.

Mr. Austin F. Park, an Associate Member of the American Ornithologists' Union, died at his home in Troy, New York, September 22, 1893, aged 68 years. Mr. Park was born in Canaan, Columbia County, N. Y., May 11, 1825, and after a preparatory education entered the Rensselaer Polytechnic Institute, in Troy, from which he was graduated in 1841 with the degree of Civil Engineer. He remained, however, for some time longer at the Institute, as a student of chemistry, geology, botany and natural history. Later he was engaged in engineering and surveying, and afterwards as a mathematical and philosophical instrument maker, and was

a successful inventor. Later in life he became a solicitor of patents, which profession he followed until the illness which caused his death. Throughout his life he was an earnest student of natural history, and was especially interested in ornithology. He was one of the founders of the Troy Scientific Association, before which he gave many addresses on scientific subjects. His collection of birds is one of the finest private collections in the State, it including most of the species found in eastern North America. He was especially interested in the study of the brains of birds, of which he prepared many dissections, and accumulated an extensive series of observations on the relative weight of the brain, and of its different parts, in various species. It is to be regretted that he neglected to publish the results of these investigations in some scientific journal, as was his intention. His ornithological publications are mainly limited to scattered notes in various ornithological or other natural history journals, and articles in the Troy 'Times' newspaper.

He is spoken of by those who best knew him as a kindly, genial man, who possessed the affection of a wide circle of friends.

MR. BENJAMIN F. GOSS, an Associate Member of the A. O. U., died at his home in Pewaukee, Wisconsin, July 6, 1893, aged 70 years. Although Capt. Goss published very little, he is well known to a wide circle of ornithologists as an enthusiastic and careful collector, especially of birds' nests and eggs, and through his extensive correspondence with publishing ornithologists many of his valuable observations have long since found their way into the literature of ornithology. He was a valued correspondent of the late Dr. Brewer, and frequent contributions from his pen are acknowledged by Captain Bendire in his 'Life Histories of North American Birds,' and by his brother, the late Colonel N. S. Goss, in his 'Birds of Kansas.' The brothers Goss were devotedly attached to each other and shared many expeditions in company in pursuit of ornithological treasures. As recorded by Col. Goss in inscribing to his brother his 'History of the Birds of Kansas,' Mr. B. F. Goss's collection of North American eggs and nests is well known as one of the most important private collections in the West, which of late has been on exhibition in the Milwaukee Public Museum.

MR. CHARLES F. ADAMS, of Champaign, Ill., a zoölogical collector of wide experience and a superior taxidermist, one of the Associate Members of the American Ornithologists' Union, died suddenly in Chicago, May 20, 1893, of congestion of the brain. He was engaged at the time on the installation of the ornithological exhibit of the Illinois State Laboratory of Natural History in the Illinois State building at the Columbian Exposition,—an exhibit to whose preparation he had devoted eighteen months of continuous labor.

Mr. Adams was born Aug. 23, 1857, near Champaign, Illinois, and received his early education in a country school. In 1876 he entered the University of Illinois, devoting much time to taxidermy. While an undergraduate he made a successful collecting trip to Florida in the interest of

the University museum. Continuing his studies as he found time, he graduated from the School of Natural History in 1883. Two years were then spent by him in the service of Ward's Museum, after which he was occupied for a short time in Washington, and did some excellent work for the Smithsonian Institution. He next went to Auckland, New Zealand, where he served for three years as taxidermist to the curator of the city museum. At the expiration of this engagement he made a tour for study and collection in Northeast Borneo, where he accumulated valuable material, chiefly birds and mammals, and did considerable work for the Auckland Museum. His unassuming narratives of the experiences of this trip possessed a peculiar and absorbing charm, and were a rare treat to those privileged to listen to them. Returning to America by way of London, he occupied his time in the service of the University of Illinois, and in mounting and disposing of his Bornean and New Zealand collections. The greater part of these went to the above University, to the Smithsonian Institution and the National Museum, and to the Museum of the city of Milwaukee, but a considerable part of these most excellent collections remained in his possession at the time of his death. In 1890 he made a joint expedition with Dr. Baur, of Clark University, to the Galapagos Islands, where he spent six months in energetic collecting, securing material of exceptional value. Upon his return he immediately undertook the preparation of the exhibit on which he was at work at the time of his death.

Mr. Adams's principal contributions to the literature of ornithology are contained in a paper on the birds of Northeast Borneo, based on his collections, and published by Mr. D. G. Elliot.

Not only was he a close and devoted student of nature, and a successful collector, but also a man of sterling qualities; and his frank, genial, and modest disposition won enduring friendships for him wherever he went.

THE ELEVENTH CONGRESS of the American Ornithologists' Union will be held in Cambridge, Mass., beginning Monday, November 20, 1893, and continuing the following days. The meetings will be held in the Nash lecture-room in the University Museum, Oxford St.

In accordance with a vote to that effect at the last Congress, an evening session will be held on Monday evening, for the election of officers and members and the transaction of routine business, so that Tuesday, usually employed for this purpose, may be wholly given up to the reading and discussion of scientific papers. Members intending to present papers are requested to send the titles of the same to the Secretary, Mr. John H. Sage, Portland, Conn., at least not later than November 15, in order to facilitate the preparation of a program of papers to be read before the Congress.

Members who wish lodgings secured for them in Cambridge during the Congress are requested to send their names, before November 1 if possible, to Mr. Montague Chamberlain, Harvard University, Cambridge.

IT HAS recently been announced that "a Congress on Birds will be held in Chicago during the month of October under the auspices of the World's

Congress Auxiliary." It is the design of the committee having the matter in hand "to have the Congress treat of birds from the standpoints of the scientist, the economist and the humanitarian." It is "the wish of the committee to enlist the co-operation of scientists in the proposed Congress, in order that the study and culture of birds may become more general and may be appreciated at its true worth by the people. The true scientist only can prove the value and interest that lie in the department of ornithology, and in its appreciation does the importance of the two other divisions depend. The audiences of the Congress," says the circular of the committee, "will doubtless be largely composed of those who, through æsthetic and humane sympathy rather than intellectual appreciation, have been attracted to the subject, and they will prove a fertile soil for the popularizing of the science."

While technical papers would obviously be out of place, there is room for a wide range of semi-popular communications adapted to interest and educate the mixed audiences that will attend the Congress. The committee solicits especially those of a practical character, bearing upon the rearing and taming of song birds, methods of promoting the increase of beneficial species, and especially of checking the indiscriminate slaughter of useful and beautiful varieties, including the subject of legislation for their preservation.

The time designated for the Congress is the week beginning October 16. It is hoped that ornithologists will render any aid in their power to make the occasion a success. There is a general Committee of six, with Dr. Elliott Coues as Chairman and Prof. S. A. Forbes as Vice-chairman, and a Woman's Committee of six, with E. Irene Rood as Chairman. The Advisory Council has not yet been announced.

WE HAVE recently received Volume I of Mr. Henry Nehrling's English edition of his great work on North American birds. It forms a quarto of over 400 pages, with 18 colored plates, and in point of typography is an elegant example of book-making. As is known to many readers of 'The Auk,' the work has for some time been appearing in Parts (see Auk, VII. p. 78, etc.), and now that the first half has been gathered into book form the author improves the occasion to make known more definitely than heretofore, apparently, the exact scope of his enterprise. It appears also that a change has been decided upon in the title, which is now 'Our Native Birds of Song and Beauty.' The author further says in his preface: "The title does not give the reader a full idea of the scope and contents of the work. It treats of all our native birds from the Thrushes to the Parrots, including all our Songbirds, Flycatchers, Hummingbirds, Swifts, Goatsuckers, Woodpeckers, Kingfishers, Trogons, and Cuckoos, from the Atlantic to the Pacific, and from Alaska and Labrador to Florida and Mexico." The work "is intended to fill the gap between the very expensive and the merely technical ornithological books," and "to combine accuracy and reliability of biography with a minimum of technical description." There is evidently a field for such a work, which Mr. Nehrling's book seems well adapted to fill.

THE following Post Office news item will doubtless be of interest to many readers of 'The Auk.' "A proposition submitted by the Postmaster General to the International Postal Bureau to admit specimens of natural history to the international mails at the postage rate and conditions applying to 'samples of merchandise' has been rejected by a vote of the countries composing the Universal Postal Union, and consequently all such specimens (except those addressed to Canada or Mexico) must be fully prepaid at letter rates; and *dried animals and insects* cannot be sent under any conditions, being absolutely excluded by the provisions of the Universal Postal Union Convention, regardless of the amount of postage prepaid thereon. This will prevent the exchange of such specimens between collectors, natural history museums, etc., by international mails, and no package *known* to contain them can be accepted at a post office for mailing to foreign countries. Natural history specimens (other than dried animals and insects) may be sent to Canada as 'merchandise' at one cent an ounce. They may also be sent by parcel post to Mexico and to all other countries with which the United States has parcels post conventions."

THE HON. WALTER ROTHSCHILD has issued a prospectus of a new journal of natural history in connection with his museum at Tring, England, to be entitled 'Novitates Zoologicæ.' It will be imperial octavo in size, and form an annual volume of about 400 to 600 pages, with ten to fifteen plates. It will contain articles on insects, birds, mammals, reptiles and fishes, and also on general zoölogy and palæontology. The parts will appear at irregular intervals, beginning with January, 1894. Subscriptions (21 shillings yearly) may be addressed to Ernst Hartert, Zoölogical Museum, Tring, Herts, England.

The collections forming Mr. Rothschild's museum were begun in 1875, and the building containing the collections was started in 1888 and first opened to the public Sept. 1, 1892. In November of the same year the well-known ornithologist, Mr. Ernst Hartert, was given the general curatorship. The museum contains two distinct departments, the 'Public Galleries' and the 'Student's Department.' The former contains large collections of mounted specimens in all departments of zoölogy; the latter is "entirely devoted to ornithology, coleoptera and lepidoptera." The birds already number about 40,000 skins, representing over 7000 species.

R. H. PORTER, the London publisher, has issued a prospectus of a work entitled 'The Avifauna of Laysan and the neighboring islands; with a complete history of the Birds of the Hawaiian Possessions,' by the Hon. Walter Rothschild. It will be illustrated with 46 colored and 8 black plates by Messrs. Keulemans and Frohawk, and 18 collotype photographs, the latter "showing various phases of bird-life and landscape." The edition will be limited to 250 copies, and no separate parts will be sold. The book will be published in three parts, imperial quarto, at £3 3 s. per part.

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ERRATA.

Page 17, line 8, for 'hudsonicus' read 'hudsonius.'
" 125, " 37, " 'cincinnatus' " 'cincinatus.'
" 126, " 39, " 'hudsonius' " 'hudsonica.'
" 135, " 32, " 'Myiadestes' " 'Myadestes.'
" 220, " 19, " 'manduyti' " 'mauduyti.'
" 242, " 12, " **'ostralegus'** " **'palliatus.'**
" 243, " 24, " **'fuscus'** " **'phœbe.'**
" 274, " 44, " 'Jer. Falcon' " 'Jer Falcon.'
" 287, last word " 'raising' " 'raisin.'

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